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Skeptical Inquirer™

THE MAGAZINE FOR SCIENCE AND REASON
Volume 31, No. 6 • November/December 2007 • INTRODUCTORY PRICE U.S. $4.95 • Canada $5.95

Vaccines and Autism

Myths and Misconceptions

- Vaccines and Safety
- An Epidemic of Autism?

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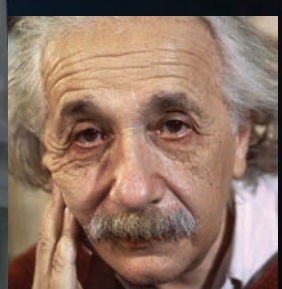

End of the Einstein Astrology Hoax

Masaru Emoto's Wonderful World of Water

Published by the Committee for Skeptical Inquiry

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The SKEPTICAL INQUIRER (ISSN 0194-6730) is published bimonthly by the Committee for Skeptical Inquiry, 3965 Rensch Road, Amherst, NY 14228. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $4.95. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or MasterCard. Canada Publications Mail Agreement No. 41153509. Return undeliverable Canadian addresses to: IMEX, P.O. Box 4332, Station Rd., Toronto, ON M5W 3J4.

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Subscriptions and changes of address should be addressed to: SKEPTICAL INQUIRER, P.O. Box 703, Amherst, NY 14226-0703. Or call toll-free 1-800-634-1610 (outside the U.S. call 716-636-1425). Old address as well as new are necessary for change of subscriber's address, with six weeks advance notice. SKEPTICAL INQUIRER subscribers may not speak on behalf of CSI or the SKEPTICAL INQUIRER.

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Editor's Note

Protecting Our Valuable Vaccine Programs

Benjamin Franklin championed vaccinations in the early years of our nation. In the past half century or so, widespread vaccination programs have wiped out or severely reduced the scourge of childhood diseases that afflicted or threatened most of us back in mid-century. Measles, chicken pox, and whooping cough used to be common (I certainly had all three), and polio was a fearsome threat that we could only hope didn't strike anywhere near us. All of that has changed. The success of near-universal immunizations of infants and children has rightly been called the greatest public health achievement in the United States in the twentieth century.

But all that is under attack in some quarters by concerns fueled by bad science and misinformation, and worse, some intentional distortions. While public support for vaccination programs remains at greater than 94 percent, some parents and a tiny fringe of doctors, aided by uncritical media reporting and some out-and-out fear-mongering, have mounted a campaign against vaccinations.

As physician and Yale neurology professor Steven Novella points out in this issue, an increasingly vocal anti-vaccination movement that blames the measles-mumps-rubella vaccine (MMR) for the rise in diagnoses of autism has merged with those who claim that mercury in vaccines, and in the environment, is the cause of an alleged autism epidemic and a host of other ills that plague mankind. We can all understand how anguished parents of an autism-afflicted child would want an external cause to blame. All the more reason to be wary of false cause-effect assertions.

The issue is not academic. The Autism Omnibus, a special U.S. Court of Federal Claims, heard testimony from nine families with members afflicted with autism in June. These are the first test cases among 4,800 other claims for compensation for alleged injuries from childhood vaccines. The court's decision will come early next year. The stakes are high. If the petitioners win, despite the overwhelming scientific evidence that vaccines and autism are not related, vaccination programs around the world could be seriously undermined. It appears to be another conflict between good science and understandable, but misguided, emotion.

In this special issue, Novella joins physician Richard Judelsohn and anthropologist and author Roy Richard Grinker (in an interview with Ben Radford) in examining and dispelling the claims that vaccines and autism are related. Fourteen epidemiologic studies have been carried out, and all show no relationship between rates of autism and frequency of use of the MMR vaccine. The Institute of Medicine has reviewed all the MMR-autism data, declared there is no association, and closed the case. The authors also make clear that the so-called "epidemic" of autism is only an apparent one, resulting from better diagnoses. Actual cases of autism appear to be static. Grinker's look at the situation in other cultures reinforces those conclusions.

* * *

If you want an amusing look at some classic pseudoscience, check out Harriett Hall's article "Masaru Emoto's Wonderful World of Water." In Emoto's weird world, he can talk to water and it responds. Just about any bizarre idea you've heard about he ascribes to water. Physician Hall, in her sixth SI article, uses her light touch to evaporate his pretensions and expose his "feel-good platitudes" and "rationalized irrationality."

Skeptical Inquirer

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Out of Body and in the Lab: New Experiments Stimulate Seeing Self Elsewhere

KENDRICK FRAZIER

Two sets of studies published independently in the same issue of the journal *Science* demonstrate how the illusion of a bodily self outside one's own body can be stimulated in the laboratory. The studies forge ways to better understand both out-of-body and near-death experiences and, perhaps more fundamentally important, the strong degree to which our sense of self is associated with our mind's perception of our physical body.

The studies are similar in many aspects. They both found ways to induce elements of the out-of-body experience in healthy volunteers. They both used head-mounted video displays to provide people with an image of themselves from a different perspective. They used various controls and used the sense of touch by stimulating, in different conditions, both the actual person's body and seemingly the illusory one. In both studies, the volunteers experienced feelings of dissociation from their own bodies—it seemed as if the tactile sensations were in the "other" body.

The first, more detailed study, "Video Ergo Sum: Manipulating Bodily Self-Consciousness," in the August 24 *Science* is by a Swiss-German team of researchers (Bigna Lenggenhager, Tej Tadi, Thomas Metzinger, and Olaf Blanke). Their investigation of bodily self-consciousness produced an illusion during which healthy participants experienced a virtual body as if it were their own and localized their "selves" outside of their bodies at a different position in space.

They designed their experiment drawing on clinical data in neurological patients reporting out-of-body experiences. These earlier data, they say, suggest that the spatial unity between self and body can be disrupted, leading to the striking experience that one's self is in another physical location.

In one experiment, volunteers viewed the backs of their bodies imaged from a distance of two meters projected onto 3-D video display goggles. Their backs were stroked for one minute, sometimes in synchrony with stimulation of their "virtual" body. The participants were immediately then blindfolded, passively displaced, and then asked to move back to their original position. As hypothesized, they moved closer to their "virtual" body's position.

A second experiment tried to rule out whether this drift toward the virtual body was due to a general motor bias to overshoot the position. Here the researchers instituted fake bodies, virtual fake bodies, real objects, and virtual objects. Once again, there was a sensory drift of position toward one's own virtual body and the fake body when the stroking was synchronous.

"With the use of virtual reality and multisensory conflict," the Swiss-German researchers say, "we induced an illusion that makes it possible to quantify selfhood by manipulating attribution and localization of the entire body. Our results show that humans systematically experience a virtual body as if it were their own" when visually presented in front of them and stroked synchronously. They say the find-

ing is "corroborated by the participants' mislocalization of their own bodies to a position outside their bodies. . . . Illusory self-localization to a position outside one's body shows that bodily self-consciousness and selfhood can be dissociated from one's physical body position."

The researchers acknowledge that they have induced only some aspects, not all, of out-of-body experiences. But they speculate that humans' daily experiences of an embodied self and selfhood, and the illusion they report in their study, both rely on mechanisms in the parietal junction of the brain, which is concerned primarily with sensory activities, such as receiving and interpreting information from all parts of the body. They further suggest that "experimentally creating illusions of the globalized, multisensory awareness of selfhood in a controlled manner with virtual-reality technology opens a new avenue for the investigation of the neurobiological, functional, and representational aspects of embodied self-awareness." They urge expansion of such studies into all these areas.

The second study ("The Experimental Induction of Out-of-Body Experiences") was conducted by H. Henrik Ehrsson of the Karolinska Institute in Sweden and the Wellcome Trust Centre for Neuroimaging in London.

Using a similar experimental setup, he likewise demonstrated "a perceptual illusion in which individuals experience that their center of awareness, or 'self,' is located outside their physical bodies and that they look at their bodies from the perspective of another person. The illusion demonstrates [that] the sense of being localized within the physical body can be fully determined by perceptual processes."

Participants were first seated in a chair wearing head-mounted displays showing his or her image as seen from two meters behind. The experimenter then stood beside the participant, in view, and used two plastic rods to touch simultaneously the person's actual chest, which was out of view, and the apparent chest of the "illusory body." After two minutes, the participants answered a questionnaire asking to affirm or deny ten perceptual effects. Three were designed to capture the experience of an illusion and seven served as controls for suggestibility and task compliance. Ehrsson reports that the participants affirmed the illusion statements and denied the controls, and that the difference in ratings was statistically significant.

Another experiment sought objective evidence of the illusion by registering skin-conductance response (SCR) as a measure of the emotional response when the illusory body was seemingly "hurt" by hitting it with a hammer after a period of stimulation. He observed significantly greater threat-evoked SCRs after the illusion was conditioned.

"The observed SCR difference provides objective evidence that the participants were emotionally responding as if they were located behind their physical bodies," says Ehrsson.

"The present illusion is fundamentally important because it informs us about the perceptual processes that underlie the sense of being located inside the body," he says. Correlated visual and tactile information are both important.

Concludes Ehrsson: "This finding represents a fundamental advance because the natural 'in-body experience' forms the foundations for self-consciousness."

An accompanying news report in *Science* on both experiments quotes Ehrsson, who has tried out the lab situation on himself: "You really feel that you are sitting in a different place in the room and you're looking at this thing in front of you that looks like yourself and you know it's yourself but it doesn't feel like yourself."

The research provides a physical explanation for phenomena usually ascribed to otherworldy influences.

"The research provides a physical explanation for phenomena usually ascribed to otherworldy influences," Peter Brugger, a neurologist at University Hospital in Zurich who was not involved in the experiment, told science journalist Sandra Blakeslee in her report on these experiments in *The New York Times* (August 24). Blakeslee has just published a book on closely related research titled *The Body Has a Mind of Its Own* (Random House), on how the brain maps out every point of the body, helping provide our sense of self-awareness.

Brugger is also quoted in the *Science* news section article. He notes that neither experiment replicates the full-blown out-of-body experiences in which people report "an enormously compelling sensation of separation from the body." Even so, he said, these illusions may be as close as it is possible to get in the lab.

Near-death and out-of-body experiences are frequently reported by people suffering severe and sudden injury or illness and by others during sleep paralysis, strong exertion, or intense meditation. According to Brugger, the new research is a first step in figuring out exactly how the brain creates the sensation.

Kendrick Frazier is editor of the SKEPTICAL INQUIRER.

Weekly World News Dies in Print, Lives On on the Web

For the past twenty-eight years, every time that Elvis was sighted behind a fast-food counter, every time that Bigfoot showed up in drag at a Washington, D.C., social event, and every time that Nessie crossed the Atlantic to do battle with a North American rival, the *Weekly World News* (*WWN*) was there with the story, right at the checkout stand of your local supermarket. However, with the publication of the August 27, 2007, issue, that all changed. The next time that the reporters at the *WWN* spot anything . . . *unusual*, you'll have to read about it on the organization's Web site at www.weeklyworldnews.com.

The black-and-white paper that unabashedly chronicled the exploits of Bat Boy and a cadre of other unlikely creatures and events—and still had the veins to call itself "The world's only reliable newspaper"—has ceased publication. The tabloid that mocked the tabloids—though I always wondered if everybody who was reading along got the joke—has changed to "Web-only" status.

According to no less a source than the respected news service Reuters ("*Weekly World News* to close [aliens not blamed!]," July 24, 2007), *WWN* has shut down its presses due to the pressures that are currently being felt by everyone who trades in the marketplace of periodicals, pressures generated by the rising costs of materials and the presence of the Internet as a publishing venue, among other factors. Having operated at a $160 million net loss for 2006 (again according to Reuters), the point was reached at which those pressures made implosion imminent, and the parent company, American Media, decided to shut down *WWN*, one of its many supermarket tabloids.

After all of those years on the racks—not to mention a brief stint as a television series in which recognizable character actors appeared as "experts" on a variety of subjects—*WWN* and its many features, including the pseudonymous Ed Anger's column, "My America," will be available only in electronic form. So, the next time that a president and First Spouse adopt an infant extraterrestrial or the cries of the tormented souls of the damned emanate from a newly created fissure in the earth, you'd better hope that you have 'Net access, because you won't learn about it while your groceries are being swiped across a checkout scanner. Somehow, it just won't be the same.

—David Park Musella

Until recently, David Park Musella was an assistant editor with the SKEPTICAL INQUIRER.

Studies Challenge Garlic, Beetroot Treatments against HIV

During the same week that our September/October 2007 cover article on AIDS denialism vs. science was published came the news from scientists reaffirming what the article said about AIDS denialism and obstructionism in key parts of South Africa's government.

The Academy of Sciences of South Africa said its studies had found no scientific basis for the use of nutritional supplements as a first-line defense against HIV, the virus that causes AIDS. It was an implicit rebuke to South Africa's health minister Manto Tshabalala-Msimang, who has been much criticized for questioning the safety of anti-HIV drugs and promoting homespun treatments such as garlic, beetroot, and lemon as effective agents against the disease (*New York Times*, August 23, p. 2).

The academy's report noted that a good diet was important in maintaining the body's defenses against AIDS and so didn't rule out the usefulness of good nutrition in countries such as South Africa. But it stated that a healthy diet plays a secondary role to drugs like antiretrovirals in the body's fight against AIDS. To make matters worse, Nicoli Nattrass, author of the SKEPTICAL INQUIRER cover article, now tells us that South African President Thabo Mbeki continues to support the health minister, despite recent revelations about her alcoholism (the cause of her recent liver transplant) and the fact that she was convicted of theft in Botswana (while being treated for kleptomania).

Tributes to Barry Beyerstein, Champion of Critical Thinking, Skeptical Inquiry

Barry Beyerstein is dead. I have lost a friend and colleague of thirty-plus years, and you, dear reader, have lost a champion of critical thinking and skeptical inquiry. Barry died on June 25, 2007, "with his boots on," working at his desk at Simon Fraser University (SI, September/October 2007). He was sixty years old.

Those of you who knew Barry only through his writings will remember a thoughtful man dedicated to reason and intent on exposing to critical scrutiny every sort of pseudoscientific claim. Those of you who had the opportunity to meet him—at a CSICOP conference or through participation at Ray Hyman's annual Skeptics' Toolbox in Eugene, Oregon, where Barry was on the faculty from its outset some fifteen years ago—will remember a man with a warm smile, an eagerness to engage in conversation, and a remarkable willingness to listen to what you had to say before offering his astute commentary. Few people could match Barry's ability to put others at ease and project a sincere interest in what they had to say. One couldn't help but like the man.

Barry was born in Edmonton, Alberta, on May 19, 1947. His early years were spent in Camrose, Alberta. He then moved with his family to Burnaby, British Columbia, when he was in junior high school. His parents were both born in Canada of Scandinavian heritage. His father, who had been a bank manager before becoming a career chiropractor, was a colorful character of many talents. He graduated from the granddaddy of all chiropractic colleges, the Palmer School of Chiropractic in Davenport, Iowa. Overlapping his lifelong chiropractic practice were many avocations, including that of stage magician, real estate speculator, and building contractor. When he would build a house, the family would live in it for a while before it was sold. Indeed, Barry and his family moved thirty times within his neighborhood while he was growing up! If that mixture of careers were not enough, Barry's father also wrote and published his own self-help books and operated a cosmetics manufacturing business that was based on his own cosmetic preparations. He was also a founding member of the Alberta-based Social Credit party, which had as its central political plank a bizarre economic notion which critics lampooned in terms of "something for nothing" and "funny money." He nonetheless managed to win his seat, and he served one term in Ottawa as a Member of Parliament.

In contra-balance to such paternal "freneticism," Barry's mother, now in her nineties and still leading an active life, was a strong and calming influence and pursued only one career outside the home: she was a school teacher.

Everyone of more than only passing acquaintance with Barry will recognize the echoes of both parents' characters in Barry's makeup. His mother's calmness and her love of teaching provided the steady hand to Barry's character development and probably also influenced his career choice, but his father's wide-ranging interests and his ability to become expert in so many things at once was reflected in Barry's amazing knowledge of such a wide array of subjects.

Barry was a member of the first graduating class from Simon Fraser University, where he earned a bachelor of arts (Honours Psychology) degree. He then attended graduate school at the University of California at Berkeley, where he was awarded a PhD in Experimental and Biological Psychology. It was in Berkeley that he met Suzi, and the two went on to become a poster couple for happy marriage. After graduation, Barry fulfilled his dream of returning to teach at Simon Fraser, where he spent his entire professional life, ultimately being promoted to full professor. His scholarly research related to brain mechanisms of perception and consciousness, the effects of drugs on the brain and mind, and the contribution of olfactory perception to human cognition and emotion.

In terms of Barry Beyerstein the skeptic, he was a Fellow of CSI and a member of its Executive Council, associate editor and frequent contributor to the *Scientific Review of Alternative Medicine*, and member of the Editorial

I found Barry through a short article in *Scientific American* some twenty years ago. Shortly after we met, we, along with his brother Dale, founded the British Columbia Skeptics. Since then, I have become close friends with Barry, his wife Suzi, his brother Dale, his daughter Lindsay, and his son Loren.

Barry Beyerstein was the quintessential skeptic: polite, learned, resolute, honest and frank. He never asked more of claimants than what they claimed. As for myself, Barry enriched my life. I learned a lot from him and got to meet many fascinating people through him.

Barry was a humanist. His hope was to leave this world a little better than when he entered it, and I know he did. His achievements in science are noteworthy. To name just one accomplishment, he and his brother all but eliminated graphology from the B.C. landscape. Other targets are too numerous to mention, but all were worthwhile.

Barry's sudden death was a shock.

I think our only grip on immortality is what others think of us, that is—the judgment of history. I, for one, will do my best to see that Barry's legacy lives on.

—*Lee Moller*

Lee Moller, a software developer, helped to co-found the B.C. Skeptics with Barry and his brother Dale in 1987 and serves as editor of its newsletter, The Rational Enquirer.

Board and again, frequent contributor to the SKEPTICAL INQUIRER. He wrote books, book chapters, and articles examining various paranormal and alternative therapeutic beliefs, founded and chaired the B.C. Skeptics, and was interviewed relentlessly by the media whenever any weird claim made the news.

One would think that all this should be enough accomplishment for one man, but there is more. (Remember his father, the chiropractor/politician/magician/et cetera!) Barry was also a founding member of Canadians for Rational Health policy; a member of the Advisory Board of the Drug Policy Foundation (Washington, D.C.); founding board member of the Canadian Foundation for Drug Policy; and contributing editor of the *International Journal of Drug Policy*. He often served as an expert witness in civil and criminal trials, where he testified regarding drug effects on consciousness, memory, perception, aggression, and on such topics as addiction and recidivism. He once addressed the House of Commons Standing Committee on Health during discussions leading up to the passage of the Controlled Substances Act. More still: he was active, along with his brother Dale, in the British Columbia Civil Liberties Association.

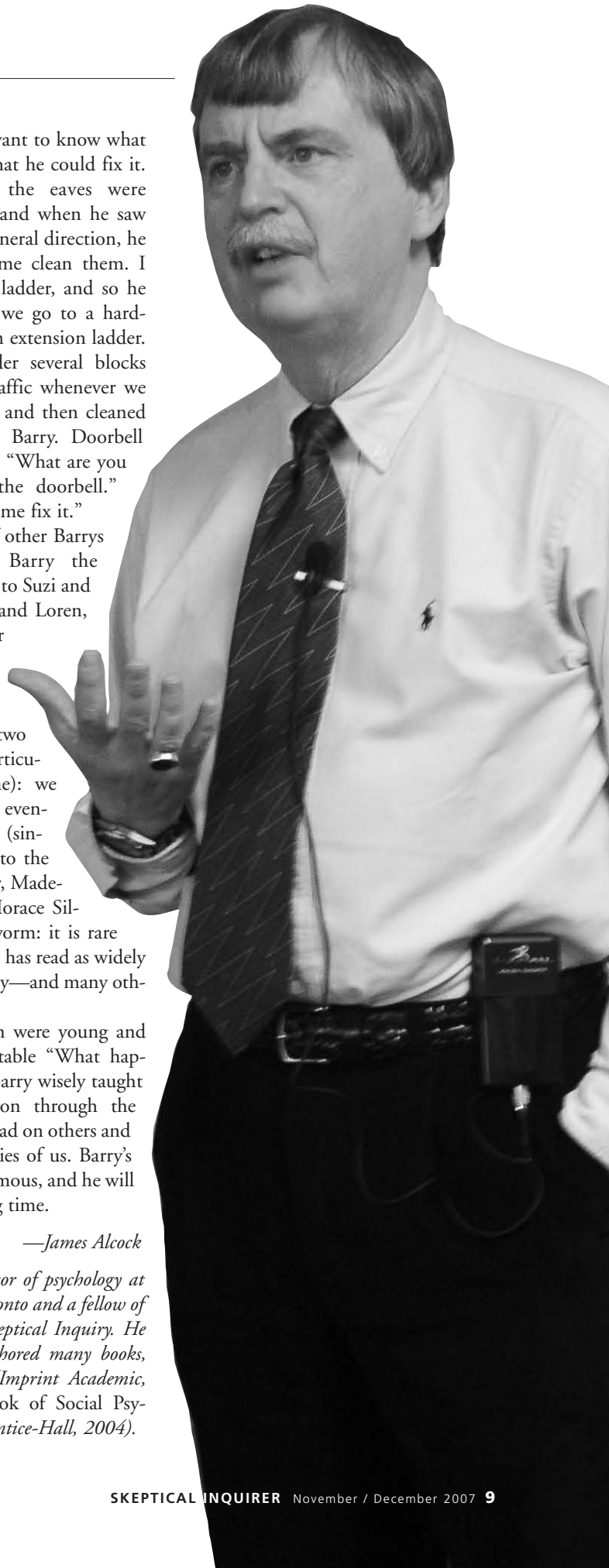
And then there was Barry the Handyman. Barry and Suzi worked with an architect to design their superb home in Port Moody, a suburb of Vancouver, and as long as I knew Barry, he was busy renovating it with great skill. For example, while the house was being built, he did all the wiring himself, and the result passed inspection with flying colors. He installed several huge, seven-and-a-half-foot doors that were once part of a ship. Barry the Handyman was indeed so willing to help others that it was sometimes difficult not to take advantage. He would often, on his way to a CSICOP meeting in Buffalo, stop off at our place in Toronto for a couple of days, and then we would drive to Buffalo together. All I would have to do is look pensively at some part of our house, and Barry would immediately want to know what I was looking at so that he could fix it. On one occasion, the eaves were clogged with leaves, and when he saw me looking in that general direction, he insisted on helping me clean them. I did not have a long ladder, and so he further insisted that we go to a hardware store and buy an extension ladder. We carried the ladder several blocks home, holding up traffic whenever we had to cross a street, and then cleaned the eaves. That was Barry. Doorbell didn't work properly? "What are you looking at?" "Just the doorbell." "Doesn't it work? Let me fix it."

There were lots of other Barrys too, among them Barry the Family Man: devoted to Suzi and his children Lindsay and Loren, and to his mother Christine and brother Dale; Barry the Jazz and Scotch aficionado (these were two of the Barrys that particularly appealed to me): we spent many a happy evening lifting our spirits (single malts, of course) to the sounds of Ben Harper, Madeleine Peyroux, and Horace Silver; Barry the Bookworm: it is rare to meet someone who has read as widely and deeply as did Barry—and many other Barrys as well.

When his children were young and they asked the inevitable "What happens when we die?" Barry wisely taught them that we live on through the impact that we have had on others and through their memories of us. Barry's impact has been enormous, and he will live on for a very long time.

—James Alcock

James Alcock is professor of psychology at York University in Toronto and a fellow of the Committee for Skeptical Inquiry. He has written or co-authored many books, including Psi Wars *(Imprint Academic, 2003) and a* Textbook of Social Psychology*, 6th Ed. (Prentice-Hall, 2004).*



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CSI Committee for Skeptical Inquiry

Toni Van Pelt, Paul Kurtz, and Ron Lindsay (standing); Lawrence Krauss, David Helfland, and Nobel Laureate Paul Boyer (seated) introduced the Declaration in Defense of Science and Secularism at the inaugural press conference of the Center for Inquiry/Office of Public Policy in Washington, D.C.

Local leaders, campus activists, and students from around the world came together at CFI's 2006 Summer Session.

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Ralph Estling, Eclectic Writer, 1930–2007

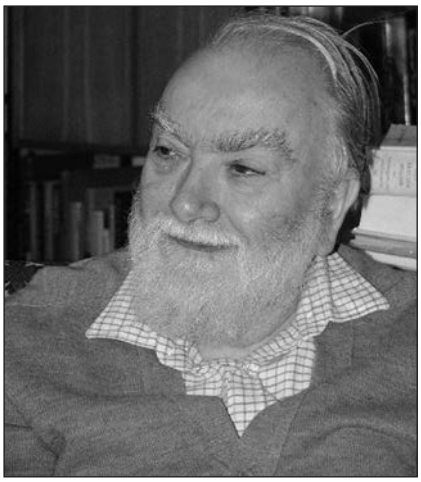
Ralph Leonard Estling, who died in July at the age of seventy-seven, was born in the Bronx, New York. His father was a janitor of Jewish immigrant descent. Encouraged by his sister, Estling showed an early, precocious literacy. After the family had moved to the West Coast, he secured a place at the University of California, Berkeley, where he earned his B.A. in English literature and also edited the humorous *Pelican Magazine*.

After national service, his love of the classics drew him to Perugia, Italy, where he studied Italian. He then entered the U.S. State Department in Washington to train as a diplomat. His first posting in 1957 was as third secretary at the Embassy in London, where he met his eventual wife, Gillian, a British protocol assistant. His diplomatic career continued for the next eleven years, rising to Vice Consul, with postings to Athens, Teheran, Saigon (where he was caught up in the Tet offensive), and finally Hong Kong. In 1968, he found himself at odds with the State Department over aspects of foreign policy and resigned his post. He moved to San Francisco, and in 1969 married Gillian to settle down together after their many years of separated globetrotting.

For the next two years, Estling poured his efforts into writing. He penned a total of six fiction books in differing styles, plays, and verse. His writing style was intellectual, full of subtlety and irony but not popularist. Being a humble man writing primarily for enjoyment, he did not aggressively pursue publication. His last book, *Far House*, set during the Vietnam conflict, was accepted by a publisher who went bust shortly before the book was to be published.

In 1971, the Estlings moved to England where he trained as a teacher. He taught English Literature in Cornwall, and then in Somerset where he and Gillian settled in the idyllic village of Dowlish Wake in a fifteenth-century former parsonage. Estling taught for fifteen years in Yeovil, where he also became a school governor before retiring in 1989 due to ill health.

He continued his love of reading and writing, his main activity for several hours a day, for the rest of his life. His interests were eclectic, covering history, literature,



the arts, science, and philosophy, with a special affinity for cosmology and evolution. He used his accumulated knowledge to educate, debate, and provoke others to do the same, with a towering intellect tempered by humor* and a genuine compassion for others. He wrote regular pieces for the *New Scientist* for sixteen years, SKEPTICAL INQUIRER'S Forum section for fourteen years, and articles and short stories for various publications, including *The London Magazine.*

He had a lifelong interest in philately, with an extensive collection covering the first century of world stamps, including every single American stamp before 1940. Palaeontology also intrigued him, the Somerset area being abundant in fossils, which he collected. He had an extensive worldwide circle of friends and spent his final years doing what he enjoyed most in a place he loved with his devoted wife by his side.

After an enjoyable and active summer day on July 6, 2007, Estling died suddenly but painlessly at home in his favorite chair, after a remarkably rich and accomplished life.

—Chris Brewchorne

Chris Brewchorne, a potter, was a friend and neighbor of Ralph Estling. E-mail: old claypaws@yahoo.co.uk.

*Ralph Estling always carried a Peanuts cartoon in his wallet:

Linus, "I have heard that it is better to light a single candle than to curse the Darkness."

Charlie Brown, "That's true, although there will always be those who will disagree with you."

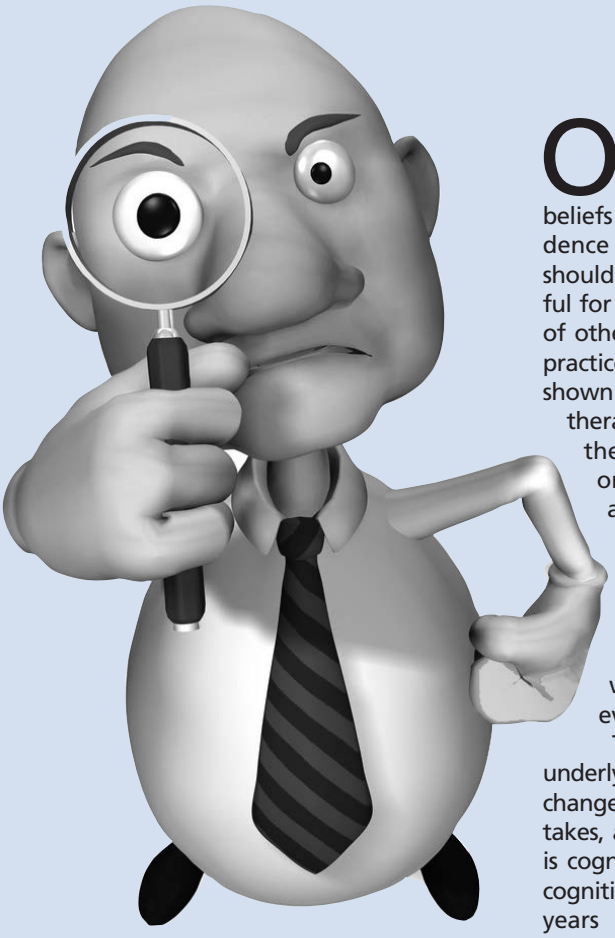
Lucy (standing alone in the night) shouts, "You stupid Darkness!"

Paul MacCready
(1923–2007)

Paul MacCready was a visionary aeronautical engineer trained at Caltech, the father of human-powered flight (the *Gossamer Condor* in 1977 and the *Gossamer Albatross*, which crossed the English Channel in 1979), winner of more than thirty prestigious awards including the Collier Trophy for achievement in aeronautics and astronautics, founder and head of AeroVironment Inc., a strong supporter of efforts to encourage critical thinking and creative thinking, and a Committee for Skeptical Inquiry Fellow. He died August 28 at his home in Pasadena, California, at the age of eighty-one. □

'Why Won't They Admit They're Wrong?' and Other Skeptics' Mysteries

CAROL TAVRIS and ELLIOT ARONSON



Social psychologists Carol Tavris and Elliot Aronson are authors of Mistakes Were Made (But Not by Me): Why We Justify Foolish Beliefs, Bad Decisions, and Hurtful Acts *(Harcourt, 2007).*

One of the greatest challenges for scientists and educators is persuading people to give up beliefs they hold dear when the evidence clearly indicates that they should. Why aren't most people grateful for the data? It's easy to make fun of others who won't give up ideas or practices that scientific research has shown to be demonstrably wrong—therapeutic touch, alien abduction, the Rorschach Inkblot Test—or beliefs in haunted houses and psychic detective skills that this magazine keeps exposing as fraud or delusion. It's harder to see that the mechanism that keeps these people from admitting they are wrong afflicts us, too—all of us, even skeptics.

The motivational mechanism underlying the reluctance to be wrong, change our minds, admit serious mistakes, and accept unwelcome findings is cognitive dissonance. The theory of cognitive dissonance was invented fifty years ago by Leon Festinger, who defined *dissonance* as a state of tension that occurs whenever a person holds two cognitions that are psychologically inconsistent, such as "Smoking is a dumb thing to do because it could kill me" and "I smoke two packs a day." Dissonance produces mental discomfort, a state that is as unpleasant as extreme hunger, and people don't rest easy until they find a way to reduce it. Smokers can reduce dissonance either by quitting or by convincing themselves that smoking isn't really so harmful and may even be beneficial. The recent lineup of Republican men who preach that homosexuality is a sin and a "choice" reduce their dissonance when caught in public places with their pants down by saying, "I'm not gay—I was just under stress."

In a sense, dissonance theory is a theory of our mental blind spots—of how and why we block information that might make us question our behavior or convictions. The theory has been supported by many discoveries in cognitive science that have identified the built-in biases of the human mind. One of the most effective ways the mind maintains consonant beliefs is through the confirmation bias—the fact that we tend to notice and remember information that confirms what we believe and ignore or forget information that disconfirms it. (Indeed, one of the reasons that scientific thinking does not come naturally to many people is precisely because it requires the investigator to consider disconfirming—dissonant—evidence for a hypothesis.) Another central bias is the belief that *we* aren't biased, everyone else is. *We* see things clearly; what is the matter with those other people? What are they *thinking?* What they are thinking, of course, is that *they* see things clearly and we don't.

Dissonance is uncomfortable enough when two cognitions conflict, but it is most painful when an important element of the self-concept is threatened: for example, when information challenges how we see ourselves, challenges a central belief (religious, political, or intellectual), or questions a memory or story we use to explain our lives. When that happens, the easiest way to reduce dissonance is simply to reject the information (it's stupid; it's flat-out wrong) or kill the messenger (he's biased, after all). But even more significantly, when people behave in a way that is inconsistent with their own view of themselves as good, smart, ethical,

and kind, they tend to reduce dissonance not by changing those self-concepts but by justifying their behavior to themselves. If I am good and kind, then by definition the bad or unkind thing I did was warranted: *They started it. He deserved it. Everyone does it. I was only following orders.*

The nonconscious mechanism of self-justification is not the same thing as lying or making excuses to others to save face or save a job. It is more powerful and more dangerous than the explicit lie, because it prohibits our own awareness that we are wrong about a belief or that we did something foolish, unethical, or cruel. Dissonance theory therefore predicts that it's not only bad people who do bad things. It also shows that good people do bad things and smart people cling to foolish beliefs precisely to preserve their belief that they are good, smart people. This is why, when skeptics wave their reams of reasoned data at people who have just sold their house and cow to follow a delusional doomsday prophet, what they are mostly doing is making the followers feel really stupid. It is much more soothing for the followers to justify their actions by saying, "Thank God we sold the house and cow for our brilliant leader! Our devotion spared the world from disaster." This was precisely the reasoning of the followers of one such doomsday prophet whom Festinger and his colleagues described in their early study of dissonance in action, *When Prophecy Fails.*

Numerous examples from the vast realms of pseudoscience fill these pages, so let's take an example that, unfortunately, is becoming increasingly common among real scientists. Most scientists pride themselves on maintaining intellectual integrity. Yet, with the breakdown of the firewall between research and commerce, scientists' intellectual independence is being whittled away. Many scientists, like plants turning toward the sun, are turning toward the interests of their sponsors without even being aware that they are doing so. When investigators have compared the results of studies funded independently and those funded by industry, they have consistently uncovered a "funding bias." In a typical example, 161 studies, all published during the same six-year span, examined the possible risks of four chemicals to human health. Of the studies funded by industry, only 14 percent found harmful effects on health. Of those funded independently, fully 60 percent found harmful effects.

Most of the scientists funded by industry are not consciously cheating, nor are they corrupt like the few who blatantly fabricate data to win fame and fortune. Rather, they are decent people who have the same cognitive blind spots we all do. If you are an independent scientist and your research reveals an ambiguous finding about your new drug—perhaps a discernable but statistically insignificant increased risk of heart attack—you will probably say, "This is troubling; let's investigate further. Is this increased risk a fluke, was it due to the drug, or were the patients unusually vulnerable?" However, if you are an industry-funded scientist motivated to show that your new drug is effective and better than older drugs, you may unwittingly lean in the direction of resolving the ambiguity in your sponsor's favor. "It was a fluke. Those patients were already quite sick anyway." This was the reasoning of the Merck-funded investigators who had been studying the company's multibillion-dollar drug Vioxx before evidence of the drug's risks was produced by independent scientists.

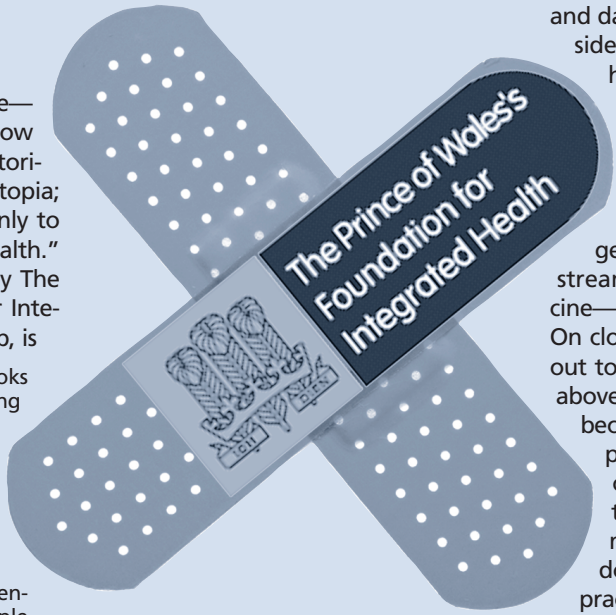
In the need to reduce dissonance, the Merck-funded scientists are no different from people who believe in the efficacy of the Rorschach or therapeutic touch. By justifying their decision to support the drug and minimize disconfirming data, they preserved their feelings of integrity and of being above the conflicts of interest that so clearly taint everyone else's judgments.

Cognitive dissonance is hardwired, but how we choose to reduce it is not. Just as good drivers learn to correct for that blind spot in their rear vision, good thinkers can learn to correct for the blind spots in their reasoning.

Cognitive dissonance is hardwired, but how we choose to reduce it is not. Just as good drivers learn to correct for that blind spot in their rear vision, good thinkers can learn to correct for the blind spots in their reasoning. Scientists must be just as vigilant about addressing potential biases and conflicts of interest that can affect their work as they are about noting biases in others' research. And we can all try to avoid that tone of "we think skeptically and you don't." One exercise in humility is to recall the dissonant pangs of embarrassment we felt when we, too, closed our minds to evidence to preserve a cherished belief. Our colleagues and friends will thank us for admitting it. And who knows, we might actually learn a little something from the mistakes we've made.

The Best of All Health Care

EDZARD ERNST



The best of all health care—who wouldn't want to know how to achieve this meritorious aim? Apparently, it's not utopia; we all can go there. We need only to follow the path of "integrated health." Integrated health, we are told by The Prince of Wales's Foundation for Integrated Health, a U.K. lobby group, is

- An approach to health that looks at the person in the round, taking into account the effects on health of lifestyle, environment and emotional wellbeing
- It offers patients the safest and most effective aspects of mainstream medical science and complementary healthcare
- It places an emphasis on prevention and self-care to help people avoid illness and stay well. (Prince of Wales 2007)

An emphasis on prevention is something I was taught thirty years ago in medical school. It has, of course, been part of medicine for much longer than that. But effective prevention needs evidence and, in this area, reliable evidence is particularly difficult to come by. It took us decades to establish that smoking cessation, blood pressure, body-weight reduction, cholesterol lowering, etc., are effective means of disease prevention. The research to identify other preventative strategies continues but faces formidable problems, often taking decades to generate reliable conclusions. To simply advise consumers that homeopathy is used to treat many health problems or that craniosacral therapy may prevent migraine attacks (Pinder et al. 2005) may look like a tempting shortcut to some, but it is hardly good enough evidence. Without evidence, we have no means of knowing whether such advice is helpful, irrelevant, or perhaps even detrimental. It would be much better to use patients' (often limited) enthusiasm for self-care in areas where we do have solid evidence, e.g., smoking cessation and regular exercise to improve health, etc. I would even go one step further and postulate that an emphasis on prevention and self-care based on wishful thinking distracts from the few evidence-based preventative strategies currently available and is therefore counterproductive.

"Looking at the person in the round" presumably means being holistic. It is hard to think of a single figure from the history of medicine who has not pointed out that patients are more than disease labels. William Osler, for instance, said in an address to students in 1899: "Care more particularly for the individual patient than for the special features of the disease." Good medicine has always been holistic. I, therefore, find somewhat offensive the implication that we need to adopt "integrated health" in order to practice what essentially is good medicine. It is insulting to all those who, day in and day out, do their very best to consider each individual patient in all her or his complexities. And this, I would suggest, includes much more than "lifestyle, environment and emotional wellbeing" (Prince of Wales 2007).

The last point—bringing together safe and effective mainstream and complementary medicine—seems reasonable at first glance. On closer inspection, however, it turns out to be the most astonishing of the above three criteria. This is surprising, because it describes the well-known principle of evidence-based medicine: implementing health care that demonstrably generates more good than harm. Surely we don't need "integrated health" to practice evidence-based medicine? It gets even more baffling knowing how little regard the proponents of "integrated health" seem to have for evidence-based medicine. Their patient guide (Pinder et al. 2005), for instance, proclaims that chiropractic "may also be used for asthma, digestive disorders, menstrual pain, and infant colic." It even implies that "the laying on of hands" can be effective for a wide range of conditions. And, of course, it overtly promotes one of the Prince's favorites: homeopathy. The actual evidence for these treatments, however, is almost entirely negative (Ernst and Canter 2006; Ernst et al. 2006).

Despite the fact that The Prince of Wales's Foundation for Integrated Health has powerful support, not least of all from the U.K. Department of Health, opposition to integrating ineffective treatments into the U.K. National Health Service is growing. A group of British scientists (including

Edzard Ernst, MD, PhD, is at the Peninsula Medical School, Universities of Exeter and Plymouth.

me) have now written twice to decision makers urging them to think again. In both cases, homeopathy was used as an example, mostly because it is a fairly clear-cut case of an implausible treatment and negative clinical evidence. As a result, two homeopathic hospitals have come under pressure to either use evidence-based medicine or face closure. But this is clearly not a "turf war"; it is a battle to make sure patients are treated with the most effective treatments currently available. They are not helped by misleading statements or by politically correct distractions. If we want to improve tomorrow's health care, we need *one* standard, not multiple standards. The best health care includes an emphasis on prevention, holism, and evidence. But this is not the hallmark of "integrated health"; it is characteristic of *all* good medicine.

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The Netherlands: Visions and Revisions

While the country's official name is the Netherlands, most people elsewhere call it Holland (even though that term really applies only to two of its thirteen provinces). Just about a tenth the size of California, the Netherlands is still one of Europe's most densely populated countries (after Monaco and Malta). It has historically been a treasure trove of geniuses—from the Dutch Masters like Rembrandt and Vermeer to such scientific pioneers as Antoni van Leeuwenhoek (1632–1723), who first identified bacteria, and Christiaan Huygens (1629–1695), who proposed the wave theory of light. Indeed, seated in the front row during my talk at a skeptics congress in Utrecht on October 28, 2006, was Gerard 't Hooft, co-winner (with Martin Veltman) of the 2000 Nobel Prize in Physics.

Of course, like people everywhere, the Dutch can also be superstitious—hence the conference theme, "the paranormal." I spoke on the relationship between Dutch and American psychics and for several days before the event toured the country with noted Dutch skeptic Jan Willem Nienhuys investigating a number of mysteries and legends. These included an Amsterdam woman's visions, haunted coal mines, the well-known boy-with-his-finger-in-the-dike tale, and more. (Our investigation of a mansion haunted by the ghost of a walled-up nun and a report on our visit to a witch weigh-house should appear in later articles.)

Joe Nickell, PhD, is the author of numerous books, including Pen, Ink, & Evidence *and* Unsolved History. *His Web site is at www.joenickell.com.*

'Visionary of Amsterdam'

In Amsterdam on March 25, 1945, the day of Catholicism's Feast of the Annunciation, a woman named Ida Peerdeman (1905–1996) was at home with her three older sisters. After a priest dropped in for a visit, Peerdeman was drawn to an adjoining room where she said she beheld an intense light from which a female figure emerged and spoke to her. Thus began a series of fifty-six apparitions of the Virgin Mary, with messages from her, that allegedly occurred over the next fourteen years (the last on May 31, 1959).

The first twenty-five messages (1945–1950) were of a general nature, with imagery and prophecies that merely reflected the political as well as the spiritual turbulence of the period. In 1950, the Virgin, Peerdeman said, appeared atop a globe and announced, "Child, I am standing upon this globe, because I want to be called the Lady of All Nations" (*Messages* 1999, p. 75). The following year, she directed that she be depicted in that persona in a painting (see Figure 1), and she advanced a new and "final" Marian dogma, that Mary was to be Coredemptrix, Mediatrix, and Advocate. The message (May 31, 1954) implied that the dogma would be proclaimed by the then-current pope, Pius XII, or at least sometime "in the twentieth century" (*Messages* 1999, p. 145–146). Neither was the case (Conte 2006).

Several other messages purported to predict future events. However, the statements, like those of French seer Nostradamus (1503–1566), are vague and open to various *later* interpretations—by a process called retrofitting (i.e., after-the-fact matching). For example, Peerdeman claimed publicly that in one message she had predicted the AIDS epidemic but had mistaken it for cholera (Van der Ven 2002). In fact, the actual reference (December 26, 1947) was to a torpedo-like device causing "terrible deadly diseases," including cholera and leprosy, and to faces "covered with dreadful ulcers, something like leprosy" (*Messages* 1999, p. 51). No place or time period was specified. Thus Peerdeman could subsequently claim to have predicted some chemical/biological attack or any of various epidemics, such as smallpox, or, later reaching for a more dramatic matching, AIDS. (For a debunking of other Peerdeman predictions, see Conte 2006.)

Peerdeman also claimed to have had a number of "Eucharistic experiences" that lasted until 1984, effectively supplanting the apparitions. That is, during the Eucharist (Holy Communion), certain visions and supernatural phenomena allegedly occurred. For example, her first experience (in 1958) involved the Catholic belief in Transubstantiation (i.e., that when partaken, the bread and wine of communion actually change into the body and blood of Jesus Christ—not merely figuratively). Speaking of the Host (the consecrated Communion wafer) Peerdeman said (Daily 2003, p. 14):

> All of a sudden the Sacred Host began to grow on my tongue, becoming larger and thicker. It seemed to expand and then suddenly it came alive. . . . It resembled a living fish, the way it moved in my mouth. I wanted to take it out of my mouth to see what it was but naturally out of reverence I did not dare.

(The fish is a symbol of Christ and Christianity [Stravinskas 2002, p. 328].)

In Amsterdam, Nienhuys and I visited the chapel of the Lady of All Nations Foundation, where the inspired painting hangs and nuns continue devotion to Ida Peerdeman and her cause. We spoke with one of the Sisters, photographed the painting, and purchased copies of the messages, a biography of Peerdeman, and other materials. Nienhuys also subsequently obtained some relevant articles, which he translated for me.

Many indicators suggest Peerdeman was highly impressionable. The youngest of five children whose mother died when she was eight, she reportedly had an apparitional experience on October 13, 1917, when she was twelve. Returning home from confession, she allegedly encountered a radiant Mary who made a friendly gesture to her. This was repeated on two following Saturdays, although her father admonished her to keep her claims to herself lest she be "ridiculed and considered crazy." While to the credulous the date seems auspicious, to skeptics it seems suspicious, suggesting imitation: it was the day that, after much publicity, an estimated seventy-thousand people gathered at Fatima, Portugal, where three children claimed the Virgin Mary would appear and work a miracle (Nickell 1993, 176–181).

On subsequent occasions at the Peerdeman home, a series of incidents occurred "that would not have been out of place in a *Poltergeist* movie." Lamps began to swing, doors opened and closed, and other phenomena occurred—all apparently without human agency (el-Fers 2002). However, time and again, when properly investigated, such "poltergeist" phenomena have turned out to be the pranks of mischief makers, typically children and teens (Nickell 1995, 79–107). The phenomena attending Peerdeman appear no different.

That Peerdeman was simply acting out repressed hostilities is suggested by certain "demonic torments" she supposedly endured as a teenager. These include a claimed street attack by a man "dressed all in black" who allegedly grabbed her arm and tried to drag her into a canal, and another incident in which an old woman supposedly lured her into the path of an approaching train. Further, she was "severely tormented by demons at home," on occasion exhibiting the typical, role-playing antics of those who are supposedly possessed: shouting, supposedly showing prodigious strength (lifting a chair over her head), and the like. Once, after "an invisible hand" allegedly choked her, an exorcism was performed, during which the family heard "Satan's revolting voice" (i.e., Peerdeman speaking in a "changed" voice) cursing the priest (Sigl 2005, p. 13–14). (For more on possession see Nickell 2001.)

Figure 1. A painting of the Virgin Mary as "the Lady of All Nations" produced at the direction of Marian visionary Ida Peerdeman. (Photo by Joe Nickell)

Peerdeman's devotees cite local bishop J.M. Punt's conclusion that "the apparitions of the Lady of All Nations in Amsterdam consist of a supernatural origin." In reaching this decision, Punt (2002) cited many reports of "healings" attributed in some way to Peerdeman. The occurrence of so-called miraculous healings is now the usual basis for determining that someone within the Catholic Church is a saint. However, "miracle" not being a scientific concept, such healings are really only held to be "medically inexplicable," and thus claimants are engaging in a logical fallacy called arguing from ignorance (that is, drawing a conclusion from a lack of knowledge). When properly investigated, "miracle" healings typically turn out to have alternate explanations: spontaneous remission (common to certain illnesses like multiple sclerosis), prior medical treatment, or even misdiagnosis, as well as psychosomatic conditions, the effects of the body's own healing mechanisms, and so on (Nickell 1993, p. 133–137). The "healings" thus far attributed to Peerdeman appear unexceptional.

In contrast to Punt's opinion that the apparitions had a "supernatural origin," an investigating commission found quite the opposite. Appointed by an earlier bishop in 1955, the group included a psychiatrist, psychologist, priest, seminary teachers, and a deacon of Amsterdam's parishes. According to their report, the committee was "deeply shocked. . . . The messages do not come from Heaven," they insisted, maintaining that the Holy Virgin had never revealed herself in such a manner. They added, "We recognize therefore that all these revelations in whatever manner have a purely natural origin."

In explaining, they observed that "Gradually one sees, as it were, a shift in persons." That is, at first Peerdeman's experiences were about herself; then later she projected her own persona onto the Virgin Mary. The commission's president characterized Peerdeman's visions as "banal, brusque, and ascerbic" (Van der Ven 2002) and concluded that the supposed visionary suffered from egocentricity (Van der Ven 2002).

Over the years, the Catholic press reportedly "demonized" her (perhaps appropriately, given the irony of her having acted in a demon-possessed manner), and she was often described by Catholic officials as "an hysteric" (el-Fers 2002). Objectively, there seems to be nothing in the claims of Ida Peerdeman that cannot be explained as the result of imagination, suggestion, or, possibly, pious deception.

Haunted Mines

The Netherlands's Limburg province (the country's southernmost) rests on coal deposits that are some 270 million years old. Coal was once an important Dutch commodity and was mined in the region, which contains many

labyrinthine mines as well as cave systems (Harmans 2005, p. 365).

Nienhuys had learned of a "haunted" mine, the Emma, but it is unfortunately now closed. Nevertheless, we were able to visit, about twenty kilometers to the south, a historical mine, Steenkolenmijn, which is open to the public as a sort of mining museum. (As Nienhuys learned, however, one must be constantly skeptical: this "coal" mine is actually an old marl pit, centuries old, that was converted to a "model mine" in 1917.)

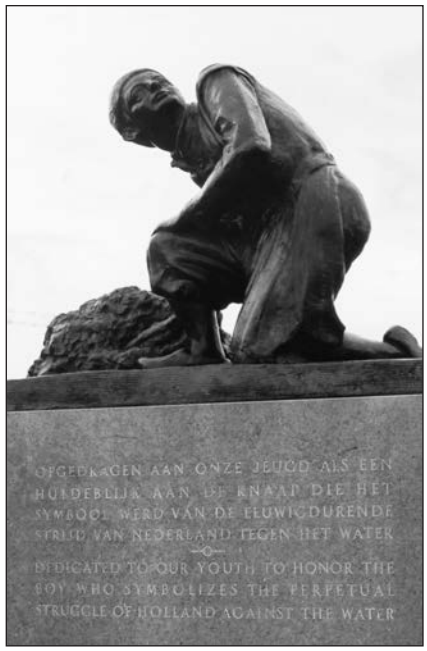
In addition to touring a mine to get a sense of the setting of mine ghost tales, we also visited the Meertens Institute in Amsterdam, which conducts research on language and culture, including ethnology and folklore. There we met with senior researcher Theo Meder who helped us sort out versions of the Emma mine's ghost tale.

The story is elaborated as a children's adventure, *Kaspar*, by Pierre Heijboer, who was himself from the village of Hoensbroek where the Emma mine is located. In the story, Little Jo had just turned fifteen and had gone to work in the mine, even though his grandmother thought this work too dangerous for him. His job was to regulate the weather-doors, leather flaps that regulated air flow.

One day there were no coal cars, but as he sat there he was visited by an old man dressed in a miner's clothes, wearing a beard, and using a walking stick. He told Jo his name was Kaspar and that he could determine who could see him and who could not. He took Jo through a hole into an old section of the mine that Kaspar said was his domain. Everywhere old supports had fallen and at one place Jo saw, sticking out, the bony hand of a miner who had been killed in a collapse. He also saw fossil trees of the type coal was made from, as well as bright crystals, and other sights. Although hours passed, he was not tired, thirsty, or hungry.

Meanwhile, Jo's grandmother was worried because he had not returned, especially when she learned that his name-token—kept on a hook during working hours as a safety precaution—was missing. After two days, everyone had given up hope of ever finding him alive again, although his grandmother kept praying for his safe return.

Then on the third day, Jo reappeared. When asked to explain what had happened, he began by saying that no one would believe him. In fact, as his family rejoiced, mine officials had a doctor examine him, and a mine policeman accused him of deserting his post. The miners' chaplain was also skeptical of his story, but his grandmother knew not to worry about him in the future because


OPGEDRAGEN AAN ONZE JEUGD ALS EEN
HULDEBLIJK AAN DE KNAAP DIE HET
SYMBOOL WERD VAN DE EEUWIGDURENDE
STRIJD VAN NEDERLAND TEGEN HET WATER
DEDICATED TO OUR YOUTH TO HONOR THE
BOY WHO SYMBOLIZES THE PERPETUAL
STRUGGLE OF HOLLAND AGAINST THE WATER
Figure 2. Statue of the imagined Dutch boy whose finger, stuck in a leak in a dike, saved his town. (Photo by Joe Nickell)

he was protected by "Kaspar, the mine ghost" (Meder 2005; 2006a).

Obviously, this narrative has a fairy-tale quality, not the least of which is its motif of passing through a hole into a mystical realm. (In Lewis Carroll's 1865 *Alice's Adventures in Wonderland*, for example, little Alice falls down a rabbit hole and into a strange land where everything occurs with fantastic illogicality.) Then there is the supernatural figure of Kaspar. Common to Dutch mine legends and myths, Kaspar is a sort of god of the underworld. He is generally malevolent, angry at humans who pillage his rich hoard of coal (Dieteren 1984, p. 33). So when miners arrived at work and found cracked supports, they would suggest, "Kaspar has been here," or when a coffee can or sandwiches went missing they would suggest, "Well, Kaspar may have taken them" (Lemmens 1936, p. 62).

If the Emma-mine story is based on an actual event, it had to have occurred between 1913, when that mine first opened, and 1936, when a version of the tale appeared in a book of mine legends (Lemmens 1936, p. 77). Meder suggests (2006) that the boy may simply have wandered off, become lost, and fallen asleep, dreaming about the old man or inventing him to provide an alibi for himself.

Asked about haunted mines, our guide at Steenkolenmijn was very dismissive, saying that ghost stories were simply used to scare beginning workers. Even so, Nienhuys did turn up some illuminating tales of mine "ghosts." One specter proved to be a miner who was covered in chalk, while another was a goat that had been surreptitiously released underground!

Still another tale, "the ghost in the mine wagon," tells about a miner who was attempting to fraudulently change the tags on coal cars to give himself credit for greater production. Suddenly, his hand was grabbed—in one version by a ghost, in another by the supervisor who had hidden in one of the cars (Nienhuys 2006).

As all these folk narratives about mine ghosts indicate, they have less insight to provide about the reality of ghosts than about the storytellers' desire to entertain or instruct within their own cultural environment.

Finger-in-the-Dike Tale

Another Dutch folktale is as well known to American tourists as it is otherwise obscure to Dutch folklorists. Americans learn it as children, an idyllic tale of a boy saving his town by plugging a leaking dike with his finger and so preventing a flood. Although not a paranormal tale, it is nonetheless an instructive one to skeptics.

Related in a text of 1865, it begins:

> Many years ago, there lived in Haarlem, one of the principal cities of Holland, a sunny-haired boy of gentle disposition. His father was a sluicer, that is, a man whose business it was to open and close the sluices, or large oaken gates, that are placed at regular distances across the entrances of the

> canals, to regulate the amount of water that shall flow into them. . . .
>
> One lovely autumn afternoon, when the boy was about eight years old, he obtained his parents' consent to carry some cakes to a blind man who lived out in the country, on the other side of the dike. . . .

Returning home, the boy stopped to pick some flowers, but, with dark falling, his attention was drawn by the sound of water trickling. He quickly understood the danger: the dike had sprung a leak!

> Quick as a flash, he saw his duty. Throwing away his flowers, the boy clambered up the heights until he reached the hole. His chubby little finger was thrust in, almost before he knew it. The flowing was stopped! Ah! he thought, with a chuckle of boyish delight, the angry waters must stay back now! Haarlem shall not be drowned while I am here!

But as night fell and the air became chilled, "Our little hero began to tremble with cold and dread." Soon, not only was his finger tired, but his entire body began to fill with pain. When no one answered his cries for help, he called on God for assistance. "And the answer came, through a holy resolution: 'I will stay here till morning.'" He suffered on, uncertain he could even draw away his finger if he wanted to. Then,

> At daybreak a clergyman, returning from the bedside of a sick parishioner, thought he heard groans as he walked along on the top of the dike. Bending, he saw, far down on the side, a child apparently writhing with pain.
>
> "In the name of wonder, boy," he exclaimed, "What are you doing there?"
>
> "I am keeping the water from running out," was the simple answer of the little hero. "Tell them to come quick."
>
> It is needless to add that they did come quickly. . . . (Dodge 1865)

It's an inspiring little story. Unfortunately, Dutch folklorists do not know of the tale from oral tradition or even an old schoolbook, but rather from an American children's novel published in 1865 by Mary Mapes Dodge (1831–1905) (Harmans 2005, p. 19). Titled *Hans Brinker or the Silver Skates*, the novel presents the tale in a chapter titled "Friends in Need." Immediately following the narrative, a character claims the story is "really true." Another replies, "True, of course it is. I have given you the story just as Mother told it to me years ago. Why, there is not a child in Holland who does not know it." But this may be no more than what literary scholars call verisimilitude (from the Latin *veri similitudo*, "resemblance to truth"), an often-used technique, or ploy, of fiction writers (Holman 1980, 459).

Still, another reason for thinking Dodge may have had a source for the finger-in-the-dike narrative is her abundant use of source material throughout the novel. This includes not only such works as Macaulay's *History of England* (1849–61), Charles Mackay's *Memoirs of Extraordinary Popular Delusions* (1841), and—since Dodge had not been to the Netherlands before writing her novel—various reference works reflecting Dutch art, science, and society. It also includes children's literature like Clement Moore's "A Visit from St. Nicholas" (1823) and certain collections of fairy tales, including those by Hans Christian Andersen (1805–1875) and Grimm's *Fairy Tales* (1812–14). Indeed, the brother and sister in Dodge's novel, Hans and Gretel, evoke the Grimm brothers' fairy-tale siblings, Hänsel and Gretel.

Yet, if the statement were true that "there is not a child in Holland who does not know it," why can no trace of it now be found earlier than Dodge's 1865 text? My own search—aided by Center for Inquiry, Director of Libraries Timothy Binga—failed to turn up any antecedent of the finger-in-the-dike motif (neither a comprehensive Internet search, nor any other). Small wonder that Dutch folklorist Theo Meder (2006b) calls the boy in the tale "the Dutch hero that never was."

Nevertheless, as a concession to American tourists, the Dutch Bureau for Tourism placed a statue of the imaginary lad at Spaarndam in 1950. Its inscription is in Dutch and English: "Dedicated to our youth, to honor the boy who symbolizes the perpetual struggle of Holland against the water" (see Figure 2). Although the boy has no name in Dodge's narrative, he is now typically referred to by the name of the main character in the novel, Hans Brinker. (While in Spaarndam, I sampled a beer spoofingly called Hansje Drinker; its label pictured a boy using his finger to plug a leaking beer barrel.) In 1954, a Dutch author rewrote the Dodge narrative, and—in keeping with the location of the statue—relocated the adventure in Spaarndam (Meder 2006b).

In this way, what appears to have begun as a lighthearted example of American fakelore is slowly metamorphosing into a bit of Dutch verisimilitude.

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Beyond Selfish Genes

Richard Dawkins's classic book, *The Selfish Gene* (1976), presented to the public the astonishing idea that organisms are "lumbering robots" controlled in their actions by "selfish" pieces of DNA bent on ensuring their own reproduction, come what may. Dawkins's follow-up book, *The Extended Phenotype* (1982), attempted to meet some of the criticisms raised against *The Selfish Gene*, mostly that it presented far too simplistic a view of evolution, and that its tone and metaphors were too easily interpreted as fostering the myth of genetic determinism (despite Dawkins's denials over time that he subscribes to it).

Yet the damage was done. Far more people read Dawkins's first book (which was aimed at the general public) than the second, more scholarly one. Moreover, although *The Selfish Gene* was largely a popularization of technical ideas by evolutionary biologists such as William Hamilton (Oxford University) and George Williams (Stony Brook University, New York), it began to be discussed in the literature as if it were a primary source, an unfortunate outcome both for Dawkins (who became a target for the sort of heavy criticism that is not usually aimed at popular books) and for the originators of the basic ideas themselves (who remained somewhat peripheral to the public discussion).

Be that as it may, it is time to lay the selfish gene metaphor to rest, or at least to seriously appreciate its strict limits. Dawkins's basic idea is that evolutionary biologists should adopt what he calls a "gene's eye view" of evolution, since the genes, not the organisms, species, or any other level of biological organization, are really the targets of natural selection and chief actors in the evolutionary drama. This shift in perspective, which followed the explosive success of molecular biology beginning with the discovery of the structure of DNA in 1953, was based on the simple idea that genes, not organisms, provide historical continuity since it is genes, not the traits of organisms, that are passed from one generation to the next. As Dawkins put it, evolution is about the "replicators" (the genes) though the latter's fate is mediated at each generation by the "interactors," i.e., the organisms that interact with the environment.

But a number of scientists and philosophers soon pointed out that things aren't quite that simple. One of the first criticisms leveled against the view of the centrality of the gene was a simple observation made by geneticist Richard Lewontin and philosopher Elliott Sober. They emphasized that genes are never found isolated inside organisms, they are parts of genomes, and genes have to interact (through their products—usually, but not always, proteins) with other genes. Based on this logic, it is easy to construct models showing that—at most—selection acts on an ensemble of genes (i.e., on genotypes), not on individual genes.

Dawkins responded with the interesting maneuver of treating every other gene as a part of "the environment" of any focal gene under study. While this in a sense rescues the selfish gene idea, it begins to show the clumsiness of the approach, because now the remainder of the genome behaves simultaneously as a set of replicators, a set of vehicles (because of other gene's interactions with the focal one), and part of the "environment."

Things got worse from that point on. Recent research by Mary Jane West-Eberhard (Smithsonian Institution) and others is helping to re-establish the classic Darwinian idea that selection acts (primarily) on organisms, not genes. Indeed, a phenomenon that had rarely been studied when *The Selfish Gene* came out, known as "phenotypic plasticity" (the ability of an organism to accommodate environmental variation by altering its own developmental trajectory) suggests that the first step in evolution may often be mediated by the phenotype, with genetic changes *following* (as opposed to leading, as in the standard theory), eventually stabilizing whatever outcome is initially favored by natural selection.

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An even broader challenge to the gene's eye view of things has been brought by the resurgence of the idea of group selection, which—in its naïve version—was a primary target of some of Williams's original work that inspired Dawkins. Williams had convincingly shown that there is no such thing as selection for "the good of the species" (a still amazingly popular misreading of the theory of evolution). However, recent work spearheaded by David Sloan Wilson (Binghamton University, New York) and others has succeeded in outlining what realistic conditions can in fact yield group-level selection, and empirical research supporting some group-selective scenarios has begun to accumulate (this is particularly relevant to the understanding of human evolution, especially evolution mediated by cultural traits).

Finally, very recent evidence supporting the existence of an additional layer of heritable *epi*-genetic information (i.e., information that is not carried by the genes themselves) has even put in some doubt the sharpness of the original distinction between replicators and interactors, as pointed out by philosopher Paul Griffiths (University of Exeter, England) and biologist Eva Jablonka (Tel Aviv University), among others. All of this is greatly expanding our concept of what counts as hereditary material, to the point that biologists are seriously reconsidering what, if anything, genes really *are*.

As a result of these and other serious challenges, some biologists and philosophers of science have come to an understanding of evolution as a multilevel process, where natural selection can act directly on genes (there are truly selfish genetic elements that reproduce parasitically inside the genome itself), individual organisms (as in classical evolutionary theory), social groups within species, and possibly even groups of different species (known as clades). Some authors have suggested that genes may still retain a special role because whatever change happens at higher levels is bound to be reflected (however indirectly) in changes in gene frequencies. But this "bookkeeping" role of genes in evolutionary biology is a far cry from grand statements about their alleged causal centrality. Evolution is indeed a much more fascinating and complex process than we thought. □

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Spook Hills in the Lab

Spook hills, also known as antigravity or magnetic hills, are natural places where cars in neutral gear seem to move uphill on a slightly sloping road, seemingly defying the laws of gravity. The phenomenon, found all over the world, has long kept both paranormal believers and skeptics wondering.

Some have suggested as explanation for the strange occurrence that magnetic or gravitational anomalies exist due to mysterious magnetic sources underground or secret military experiments. Magnetic causes can be ruled out easily, though, because effects are visible even on nonmagnetic materials, such as plastic balls or water poured on the ground.

The answer to this mystery is found using a simple tool. When the inclination of several such roads has been measured using spirit levels, the actual slope of the surface has consistently been found to be opposite to the apparent one. To answer the objection that gravitational anomalies would influence the level as well, my good friend and longtime colleague Luigi Garlaschelli, from the University of Pavia in Italy, also took measurements on an Italian spook hill in Montagnaga (Figure 1) from a distance (i.e., away from the stretch of road in question) using a professional surveyor's instrument called a theodolite.

The parallelism between a plumb line hanging within the critical area and another outside of it was first checked by Garlaschelli, then height quotes were taken on graduated yardsticks. The real slope was calculated at about 1 percent of the apparent slope in the opposite direction.

The simpler explanation for spook hills, then, is that they are visual illusions in a natural environment.

The phenomenon can be recreated artificially, with no intervention whatsoever of magnetic, antigravitational, or otherwise mysterious forces.

A Portable Spook Hill Experiment

Recently, Garlaschelli, along with Paola Bressan, a researcher at the Department of Psychology at the University of Padua, and Monica Barracano, also of Padua, published a report on spook hills in *Psychological Science*, the journal of the Association for Psychological Science (previously known as the American Psychological Society).

In the article, they describe four experiments showing that this phenomenon can be reproduced in a laboratory. The researchers find that the phenomenon is due to the visual anchoring of the spooky surface to a gravity-relative eye level whose perceived direction is biased by sloping surroundings.

In the first experiment, for example, they built a tabletop model with three hinged, moveable boards (Figure 2) to investigate the case in which the critical spot is a sloping stretch of road between two other stretches that both run either uphill or downhill as one moves forward from the observation point at one end.

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Because their model was 2.4 meters long, devoid of visible texture, and viewed monocularly through a reduction screen, most depth cues (aerial perspective, texture gradients, and binocular cues such as disparity and convergence) were absent.

Sixty undergraduate students were divided into three groups of twenty subjects each, with each group seeing two or three of the eight different levels of inclination. All subjects were unaware of the actual setup and purpose of the experiment.

In the experiment, the subjects sat in front of the screen one at a time. They were asked to look into a hole and describe what they saw and then assess the slope of the three stretches on a five-point scale that ran from strongly downhill to strongly uphill. Each trial was followed by a break of about one minute, during which the hole was occluded and the model modified.

The results of the experiment showed that slants are generally underestimated. Three stretches with the same slant were seen as horizontal by all subjects, whether they were truly horizontal, downhill, or uphill. A slightly downhill stretch between two strongly downhill inclines was seen as illusorily uphill by sixteen out of twenty subjects and as illusorily horizontal by the other four. This illusory effect explains what occurs at Gravity Hill in Pennsylvania.

However, a slightly uphill stretch between two strongly uphill inclines was seen by all subjects as level, not as downhill as might be expected in light of the previous finding. This result implies that inducing an illusory downhill effect is not nearly as easy as inducing an illusory uphill effect. In a further experiment, Garlaschelli and his team found that steeper inducing slopes are required to suggest an uphill slant.

"After each observer's task was concluded," say Bressan and her colleagues, "we placed a small roll of tape on the misperceived slope, and the tape appeared to move against the law of gravity, producing surprise and, on occasion, reverential fear."

Interested readers can find details on the team's various experiments in the September 2003 (14:5) issue of *Psychological Science*.

Figure 1: At this spook hill in Montagnaga (Italy), the road on the right is misperceived as running uphill.

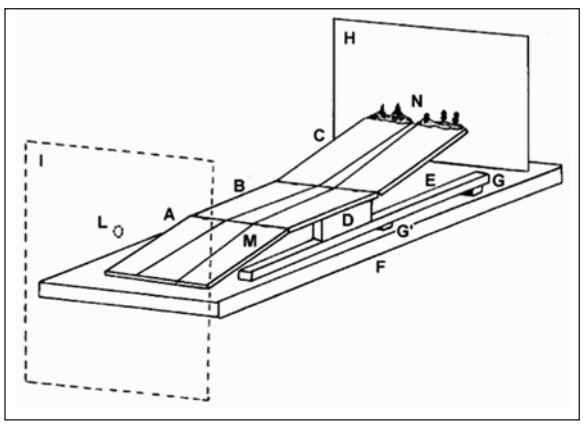


Figure 2: Schematic illustration of the tabletop model used in Experiment 1 (L is where the hole was located and in N there are a few small model trees to add to the realism of the scenery).

Experience the Spooky Effect

"The visual (and psychological) effects obtained in our experiments were in all respects analogous to those experienced on site," the researchers concluded. "The more than twenty natural cases of antigravity hills reported to date are all variations on a single theme. Our study shows that the phenomenon can be recreated artificially, with no intervention whatsoever of magnetic, antigravitational, or otherwise mysterious forces. The spooky effects experienced at these sites are the outcome of a visual illusion due to the inclination of a surface being judged relative to an estimated eye level that is mistakenly regarded as normal to the direction of gravity. Using miniature or even life-size reproductions of our tabletop models, it should now be easy to re-create the fascination of this challenge to gravity in amusement parks and, for twice the benefit, science museums anywhere."

If you'd like to experience a spook hill for yourself, Bressan and colleagues have prepared this list of the best known ones:

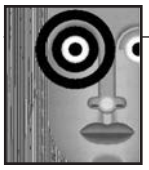
United States: Confusion Hill, Idlewild Park, Ligonier, Pennsylvania; Gravity Hill, northwest Baltimore County, Maryland; Gravity Hill, State Route 42, Mooresville, Indiana; Gravity Hill, State Route 96, south of New Paris, Bedford County, Pennsylvania; Gravity Hill, White's Hill, Rennick Road, La Fayette County, Wisconsin; Gravity Road, Ewing Road, Route 208, Franklin Lakes, Washington; Mystery Hill, Highway 321, Blowing Rock, North Carolina; Mystery Spot, Putney Road, Benzie County, Michigan; Spook Hill, North Wales Drive, North Avenue, Lake Wales, Florida; Spook Hill, Gapland Road, Burkittsville, Frederick County, Maryland.

Canada: Gravity Hill, McKee Road, Ledgeview Golf Course, Abbotsford, British Columbia; Magnetic Hill, Neepawa, Manitoba; Magnetic Mountain, Canada Highway, Moncton, New Brunswick.

Europe: Ariccia, Rome, Italy; Electric Brae, A719, Croy Bay, Ayr, Ayeshire, Scotland; Malveira da Serra, Road N247, Lisbon, Portugal; Martina Franca, Taranto, Italy; Montagnaga, Trento, Italy; Mount Penteli, Athens, Greece.

Other countries: Anti-Gravity Hill, Straws Lane Road, Wood-End, Victoria, Australia; Morgan Lewis Hill, St. Andrew, Barbados; Mount Halla, Cheju Do Island, South Korea.

Readers who know of other spook hills are invited to write to us with their locations. □



A Time to Die?

Q: On the *Montel Williams* show, Sylvia Browne recently stated that most people die within three months of their birthdays; is this true?

— M. Cushing

A: Though TV psychic Sylvia Browne has a long history of documented failures and misstatements, one must give credit where credit is due: Sylvia Browne is correct that most people die within three months of their birthday.

While Browne probably dispensed this factoid as a bit of quasi-mystical wisdom gleaned from her (real or imaginary) informants on "the other side," the issue really comes down to science and statistics. Part of the answer depends on how strictly and specifically you wish to interpret the question. Counting three months (or ninety days) to the minute of a person's birthdate will of course give a relatively narrow window, though most people (including Browne) probably begin counting from the target person's month of birth. This allows for three months before the birth, the month of the birth, and three months after the birth, for seven out of twelve months. Since this range covers well over half the year (in fact, just under 60 percent of it), the chances are somewhat better than 50/50 that a given person will die within three months of his/her birth, as Browne stated. (It should be noted that guessers working games on carnival midways allow themselves a margin of only two months before or after the mark's birth date.)

The idea that there is some sort of supernatural pattern to deaths is common in mystical thinking and many New Age beliefs. It is similar to the notion that deaths come in sets of three.

Illustration by Brian Oakes

Tens of thousands of people die every day from disease, accident, suicide, and murder. Out of all those, which are "counted"(and by whom or what) toward the string of three? And where do you start counting? If the deaths are ordered in noticeable groups of three, presumably they would come within a certain time frame, say a few days or weeks. But if you don't specify or predefine what time frame you're looking for, you won't know if you have the grouping. With any set of events, if you pick and choose which ones you notice, you can make groups of anything. People often see patterns they impose, not necessarily real patterns in the world.

Another related idea is that dying people can control when they actually expire. Obviously no one can choose the exact moment, with the exception of suicides, but anecdotes and folktales suggest that dying people can in effect will themselves to live long enough to experience a birthday, holiday, or special event.

The best research to date was a 2004 study that analyzed the records of 1.3 million people. Researchers led by Ohio State University Cancer Center's Donn Young specifically examined the death rates of three hundred thousand cancer patients. The study, published in the December 22, 2004, *Journal of the American Medical Association*, found that there was no overall increase in mortality after Christmas, as would be expected if patients were able to "hold on" through the holidays. Nor was there a correlation between the date of death and Thanksgiving or the patients' birthdays. So while a slight majority of us will die within three months of our birthdays, it seems we can't make it happen. □

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The Anti-Vaccination Movement

Despite the growing scientific consensus that vaccines are safe and that neither vaccines nor mercury cause autism, a stubborn vocal minority claims otherwise, threatening the effectiveness of this public health program.

STEVEN NOVELLA

Michelle Cedillo has autism, which her parents believe is the result of her childhood vaccines. In June 2007 they had the opportunity, along with eight other families, to make their case to the Autism Omnibus—a U.S. Court of Federal Claims that was presided over by three "special masters" appointed for the purpose. These nine cases are the first test cases that will likely determine the fate of 4,800 other claims made over the past eight years for compensation for injuries allegedly due to childhood vaccines.

Vaccines are one of the most successful programs in modern health care, reducing, and in some cases even eliminating, serious infectious diseases. Public support for the vaccination program remains strong, especially in the United

States where vaccination rates are currently at an all-time high of >95 percent (CDC 2004). Yet, despite a long history of safety and effectiveness, vaccines have always had their critics: some parents and a tiny fringe of doctors question whether vaccinating children is worth what they perceive as the risks. In recent years, the anti-vaccination movement, largely based on poor science and fear-mongering, has become more vocal and even hostile (Hughes 2007).

Of course, vaccines are not without risk (no medical intervention is), although the benefits far outweigh those risks. Because vaccines are somewhat compulsory in the United States—although opting out is increasingly easy—a National Vaccine Injury Compensation Program was established to streamline the process for compensation for those who are injured due to vaccines (USDOJ 2007). It is this program to which the Cedillo and 4,800 other families are applying for compensation.

In the last decade, the anti-vaccine movement, which includes those who blame the MMR (mumps-measles-rubella) vaccine for autism, has largely merged with those who warn that mercury toxicity is the cause of many of the ills that plague mankind. The two groups have come together over the issue of thimerosal, a mercury-based preservative in some vaccines. They believe that it was the use of thimerosal in childhood vaccines that led to the apparent autism epidemic beginning in the 1990s.

Autism is a complex neurological disorder that typically manifests in the first few years of life and primarily involves a deficiency of typical social skills and behavior. In the 1990's, the number of autism diagnoses significantly increased, from between one and three to about fifteen cases per ten thousand, although the true incidence is probably between thirty and sixty per ten thousand (Rutter 2005). During this same period, the number of vaccines given in the routine childhood schedule also increased. This led some to assume, or at least speculate, causation from correlation—perhaps the vaccines or something in them created this "epidemic" of autism.

We can now say, from multiple independent lines of evidence, that vaccines do not cause autism. For one thing, the autism "epidemic" probably does not represent a true increase in the disorder, but rather an artifact of expanding the diagnosis (now referred to as autism spectrum disorder, ASD) and increased surveillance (Taylor 2006).

In 1998, researcher Andrew Wakefield and some of his colleagues published a study in the prestigious English medical

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journal *Lancet* that claimed to show a connection between the MMR vaccine and autism (Wakefield 1998). Wakefield's theory was that the MMR vaccine, which contains a live virus, can cause in susceptible children a chronic measles infection. This in turn leads to gastrointestinal disturbances, including what he calls a "leaky gut" syndrome, which then allows for certain toxins and chemicals, like those from bread and dairy that are normally broken down by the gut, to enter the bloodstream where they can access and damage the developing brain.

Although the study was small and the evidence was considered preliminary, this article sparked a firestorm. As a result of the study and the media coverage that followed (and continues to this day), MMR compliance in Great Britain plummeted, resulting in a surge of preventable disease (Friederichs 2006).

Subsequent to the seminal article in the *Lancet*, many follow-up studies were performed testing the autism-MMR vaccine correlation. As the follow-up studies began to be published, however, it became increasingly clear that there was no link between MMR and autism. For example, a study in the *British Medical Journal* found that autism rates continued to climb in areas where MMR vaccination rates were not increasing (Taylor 1999). Another study found no association with MMR and autism or GI (gastrointestinal) disorders (Taylor 2002). Other studies showed no difference in the diagnosis rate of autism either before or after the MMR vaccine was administered (Honda 2005), or between vaccinated and unvaccinated children (Madsen 2002). Most recently, a study found that there was no decrease in autism rates following removal of the MMR vaccine in Japan (Honda 2005).

In 2001, the Institute of Medicine (IOM) reviewed all of the MMR-autism data available to date and concluded that there was no association and essentially closed the case (IOM 2001)—a conclusion confirmed by still later studies, such as the Honda study in Japan cited above.

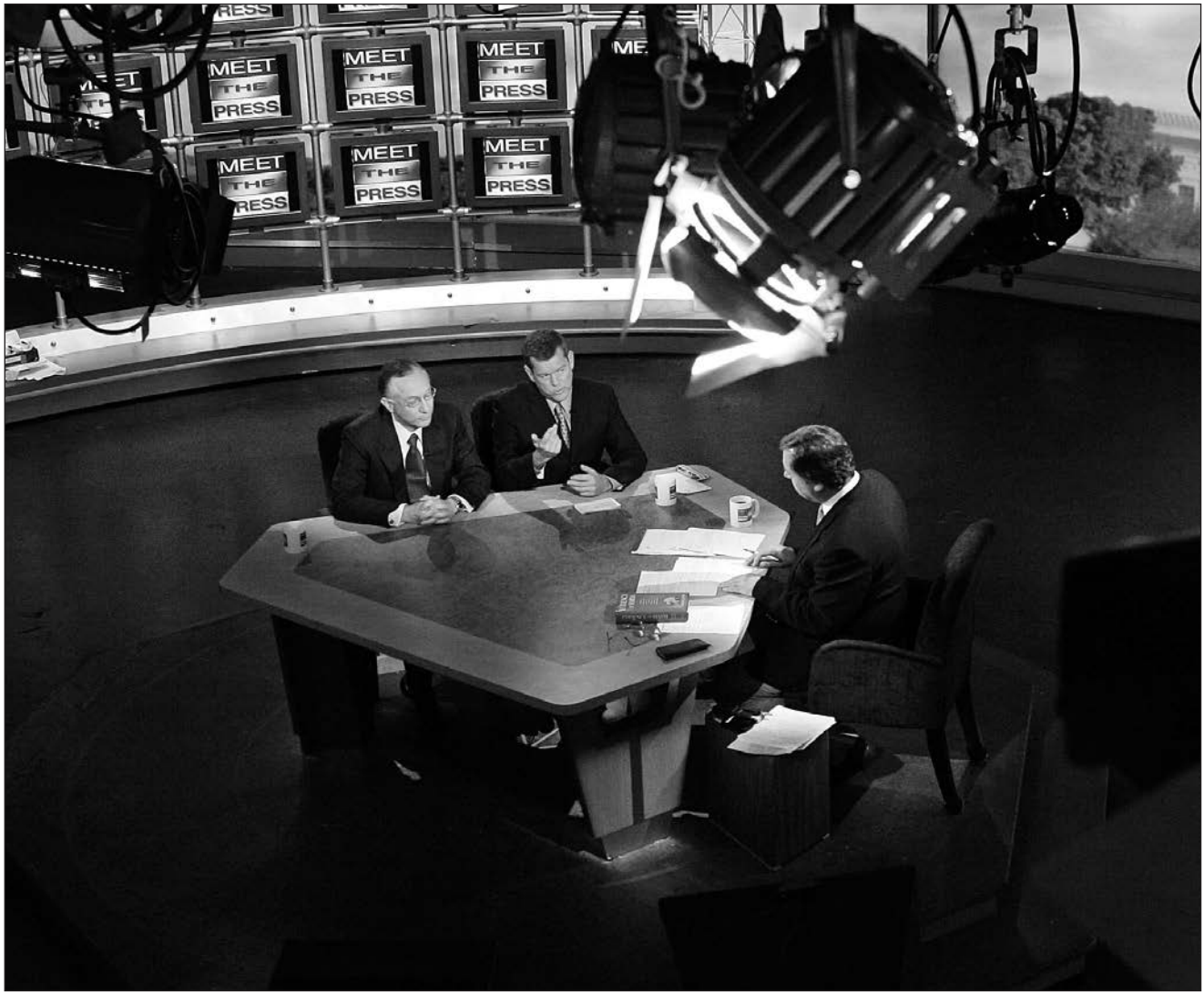
If Wakefield had simply been wrong in his preliminary findings, he would be innocent of any wrongdoing—scientists are not faulted if their early findings are not later vindicated. However, in May 2004, ten of Wakefield's co-authors on his original paper withdrew their support for its conclusions. The editors of *Lancet* also announced that they withdrew their endorsement of the paper and cited as part of the reason an undisclosed potential conflict of interest for Wakefield, namely that at the time of its publication he was conducting research for a group of parents of autistic children seeking to sue for damages from MMR vaccine producers (*Lancet* 2004).

It gets worse. Investigative reporter Brian Deer has uncovered greater depths to Wakefield's apparent malfeasance. Wakefield had applied for patents for an MMR vaccine substitute and treatments for his alleged MMR vaccine-induced gut disorder (Deer 2007). So, not only was he allegedly paid by lawyers to cast doubt on the MMR vaccine, but he stood to personally gain from the outcome of his research.

Andrew Wakefield. (Credit: Tom Miller) [Photo via Newscom]

Not only was he [Wakefield] allegedly paid by lawyers to cast doubt on the MMR vaccine, but he stood to personally gain from the outcome of his research.

Further, during the Cedillo case testimony, Stephen Bustin, a world expert in the polymerase chain reaction (PCR), testified that the lab Wakefield used to obtain the results for his original paper was contaminated with measles virus RNA. It was therefore likely, Bustin implied, that the PCR used by Wakefield was detecting this contamination and not evidence for measles infection in the guts of children with autism who had been vaccinated, as Wakefield claimed. And finally, Nicholas Chadwick testified that the measles RNA Wakefield



Author of the book *Evidence of Harm: Mercury in Vaccines and the Autism Epidemic* David Kirby (center) speaks as president Harvey Fineberg (left) of the Institute of Medicine listens during an interview by moderator Tim Russert (right) on NBC's *Meet the Press* August 7, 2005, at the NBC studios in Washington, D.C. Fineberg and Kirby talked about the rising number of autism diagnoses among children and the controversial charges of a government conspiracy to allow mercury exposures from childhood vaccines to more than double between 1988 and 1992. The Institute of Medicine reviewed all MMR-autism data and concluded that there was no association. (Photo by Alex Wong/Getty Images for Meet the Press) [Photo via Newscom]

found matched the laboratory contamination and did not match either any naturally occurring strain or the strain used in the MMR vaccine—a fact of which he had informed Wakefield (USCFC 2007).

All of this, plus other allegations still coming out, has caused Britain's General Medical Council to call Wakefield before its "Fitness to Practise" panel for review of his alleged professional misconduct (GMC 2007).

Believers in the MMR-autism hypothesis dismiss the findings of the larger and more powerful epidemiological studies that contradict a link. Instead, they have turned Andrew Wakefield into a martyr, dismissing the evidence of his wrongdoing as a conspiracy against him designed to hide the true cause of autism from the public. Wakefield is unrepentant and maintains his innocence (Gorski 2007).

With the MMR-autism hypothesis scientifically dead, attention soon shifted to thimerosal, a mercury-based preservative found in some childhood vaccines (although not the MMR vaccine). There is little doubt, and no controversy, that mercury, the major component of thimerosal, is a powerful neurotoxin, or poison to the brain. However, toxicity is always a matter of dose. Everything becomes toxic in a high enough dose; even too much water or vitamin C can kill you. So the real question is whether the amount of mercury given to children in vaccines containing thimerosal was enough to cause neurological damage.

Proponents of the mercury hypothesis argue that the ethylmercury found in thimerosal was given in doses exceeding Environmental Protection Agency limits. This load of mercury should be considered with prenatal vaccine loads possibly given to mothers, and to other environmental sources of mercury,

such as seafood. Furthermore, underweight or premature infants received a higher dose by weight than larger children. Some children, they argue, may have a specific inability to metabolize mercury, and perhaps these are the children who become autistic.

Fear over thimerosal and autism was given a huge boost by journalist David Kirby with his book *Evidence of Harm* (Kirby 2005). Kirby tells the clichéd tale of courageous families searching for help for their sick children and facing a blind medical establishment and a federal government rife with corruption from corporate dollars. Kirby echoes the core claim that as the childhood vaccine schedule increased in the 1990s, leading to an increased cumulative dose of thimerosal, autism diagnoses skyrocketed.

In the end, *Evidence of Harm* is an example of terrible reporting that grossly misrepresents the science and the relevant institutions. As bad as Kirby's position was in 2005, in the last two years the evidence has been piling up that thimerosal does not cause autism. Rather than adjusting his claims to the evidence, Kirby has held fast to his claims, which has made him a hero alongside Wakefield of the mercury-autism-connection crowd as he has squandered his credibility.

There have now been a number of epidemiological and ecological studies that have all shown no correlation between thimerosal and autism (Parker 2004 and Doja 2006). I have already mentioned that the current consensus holds that there is no real autism epidemic, just an artifact of how the diagnosis is made. If there's no epidemic, there's no reason to look for a correlation between thimerosal and autism. This has been backed up by The Institute of Medicine, which has also reviewed all the available evidence (both epidemiological and toxicological) and concluded that the evidence does not support the conclusion that thimerosal causes autism (IOM 2004).

Especially damning for the thimerosal hypothesis are the recent studies that clearly demonstrate that early detection of autism is possible long before the diagnosis is officially made. Part of the belief that vaccines may cause autism is driven by the anecdotal observation by many parents that their children were normal until after they were vaccinated—autism is typically diagnosed around age two or three. However, more careful observations indicate that signs of autism are present much earlier, even before twelve months of age, before exposure to thimerosal (Mitchell 2006). In fact, autism expert Eric Fombonne testified in the Autism Omnibus hearings that Michelle Cedillo displayed early signs of autism clearly visibly on family video taken prior to her receiving the MMR vaccine (USCFC 2007).

Meanwhile, evidence is accumulating that autism is largely a genetic disorder (Szatmari 2007). This by itself does not rule out an environmental factor, but it is telling that genetic research in autism has proven so fruitful.

Mercury alarmists, in the face of this negative evidence, have been looking for rationalizations. Some have argued that the thimerosal in prenatal vaccines may be to blame, but recent evidence has shown a negative correlation there as well (Miles 2007).

A demonstrator carries a sign protesting the use of mercury in vaccines past the U.S. Capitol in Washington July 20, 2005. Some three hundred people marched demanding that mercury not be used in vaccines anymore amid concern that it is the cause of autism and other neurological diseases in children. However, numerous studies show no correlation between Thimerosol and autism. (Nicholas Kamm/AFP/Getty Images) [Photo via Newscom]

What we have are the makings of a solid scientific consensus. Multiple independent lines of evidence all point in the same direction: vaccines in general, and thimerosal in particular, do not cause autism, which rather likely has its roots in genetics. Furthermore, true autism rates are probably static and not rising.

The only researchers who are publishing data that contradicts this consensus are the father-and-son team of Mark and David Geier. They have looked at the same data and concluded that thimerosal does correlate with autism. However, the hammer of peer-review has come down on their methods and declared them fatally flawed, thus rendering their conclusions invalid or uninterpretable (Parker 2004). Also, like Wakefield, their reputations are far from clean. They have made something

of a career out of testifying for lawyers and families claiming that vaccines caused their child's autism, even though the Geiers' testimony is often excluded on the basis that they lack the proper expertise (Goldacre 2007). The Geiers were not even called as experts in the Autism Omnibus hearings.

The Geiers are now undertaking an ethically suspect study in which they are administering chelation therapy to children with autism in conjunction with powerful hormonal therapy allegedly designed to reduce testosterone levels. Chelation therapy removes mercury, and so it is dependent upon the mercury hypothesis, which is all but disproved. Moreover, there is no clinical evidence for the efficacy of chelation therapy. The treatment is far from benign and is even associated with occasional deaths (Brown 2006).

Multiple independent lines of evidence all point in the same direction: vaccines in general, and thimerosal in particular, do not cause autism, which rather likely has its roots in genetics. Furthermore, true autism rates are probably static and not rising.

With the scientific evidence so solidly against the mercury hypothesis of autism, proponents maintain their belief largely through the generous application of conspiracy thinking. The conspiracy claim has been made the loudest by Robert F. Kennedy Jr. in two conspiracy-mongering articles: *Deadly Immunity* published on Salon.com in 2005 (Kennedy 2005), and more recently *Attack on Mothers* (Kennedy 2007). In these articles, RFK Jr. completely misrepresents and selectively quotes the scientific evidence, dismisses inconvenient evidence as fraudulent, accuses the government, doctors, and the pharmaceutical industry of conspiring to neurologically damage America's children, and accuses scientists who are skeptical of the mercury claims of attacking the mothers of children with autism.

Despite the lack of evidence for any safety concern, the FDA decided to remove all thimerosal from childhood vaccines, and by 2002 no new childhood vaccines with thimerosal were being sold in the U.S. This was not an admission of prior error, as some mercury proponents claimed; instead, the FDA was playing it safe by minimizing human exposure to mercury wherever possible. The move was also likely calculated to maintain public confidence in vaccines.

This created the opportunity to have the ultimate test of the thimerosal autism hypothesis. If rising thimerosal doses in the 1990s led to increasing rates of autism diagnosis, then the removal of thimerosal should be followed within a few years by a similar drop in new autism diagnoses. If, on the other hand, thimerosal did not cause autism, then the incidence of new diagnoses should continue to increase and eventually level off at or near the true rate of incidence. In 2005, I personally interviewed David Kirby on the topic, and we both agreed that this would be a fair test of our respective positions. Also, in an e-mail to science blogger Citizen Cain, Kirby wrote, "If the total number of 3-5 year olds in the California DDS [Department of Developmental Services] system has not declined by 2007, that would deal a severe blow to the autism-thimerosal hypothesis" (Cain 2005).

Well, five years after the removal of thimerosal, autism diagnosis rates have continued to increase (IDIC 2007). That is the final nail in the coffin in the thimerosal-vaccine-autism hypothesis. The believers, however, are in full rationalization mode. David Kirby and others have charged that although no new vaccines with thimerosal were sold after 2001, there was no recall, so pediatricians may have had a stockpile of thimerosal-laden vaccines—even though a published inspection of 447 pediatric clinics and offices found only 1.9 percent of relevant vaccines still had thimerosal by February 2002, a tiny fraction that was either exchanged, used, or expired soon after (CDCP/ACIP 2002).

Those who argue for the link have put forth increasingly desperate notions. Kirby has argued that mercury from cremations was increasing environmental mercury toxicity and offsetting the decrease in mercury from thimerosal. The Geiers simply reinterpreted the data using bad statistics to create the illusion of a downward trend where none exists (Geier 2006). Robert Kennedy Jr. dodges the issue altogether by asking for more studies, despite the fact that the evidence he asks for already exists. He just doesn't like the answer. Kennedy and others also point to dubious evidence, such as the myth that the Amish do not vaccinate and do not get autism. Both of these claims are not true, and the data RFK Jr. refers to is nothing more than a very unscientific phone survey (Leitch 2007).

The Autism Omnibus hearings have concluded, and while we await the decision due early next year, I am optimistic that science and reason will win the day. Just as shown in the 2005 Dover trial of intelligent design where the full body of scientific evidence was given a thorough airing in court and subjected to rules of evidence and the critical eyes of experienced judges, science tends to win out over nonsense. By all accounts, the lawyers for those claiming that vaccines caused their children's autism put on pathetic performances with transparently shoddy science, while the other side marshaled genuine experts and put forth an impressive case.

But the stakes are high, and not just for the 4,800 families. If the petitioners win these test cases despite the evidence, it

will open the floodgates for the rest of the 4,800 petitioners. This will likely bankrupt the Vaccine Injury Compensation Program and will also risk our vaccine infrastructure. Pharmaceutical companies will be reluctant to subject themselves to the liability of selling vaccines if even the truth cannot protect them from lawsuits.

Thimerosal still exists as a necessary preservative in multishot vaccines outside the United States, especially in poor third-world countries that cannot afford stockpiles of single-shot vaccines. Anti-thimerosal hysteria therefore also threatens the health of children in poor countries.

And of course a victory for the anti-vaccination activists would undermine public confidence in what is arguably the single most effective public health measure devised by modern science. This decrease in confidence will lead, as it has before, to declining compliance and an increase in infectious disease.

The forces of irrationality are arrayed on this issue. There are conspiracy theorists, well-meaning but misguided citizen groups who are becoming increasingly desperate and hostile, irresponsible journalists, and ethically compromised or incompetent scientists. The science itself is complex, making it difficult for the average person to sift through all the misdirection and misinformation. Standing against all this is simple respect for scientific integrity and the dedication to follow the evidence wherever it leads.

Right now the evidence leads to the firm conclusion that vaccines do not cause autism. Yet, if history is any guide, the myth that they do cause autism will likely endure even in the face of increasing contradictory evidence.

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Vaccine Safety: Vaccines Are One of Public Health's Great Accomplishments

RICHARD G. JUDELSOHN

Over the past decade, the public has been presented with a large amount of information about the safety of vaccines. Among the reasons for this interest is the widespread success of routine, universal immunization of infants and children, beginning in the 1940s. Previously common, dangerous, handicapping, potentially fatal diseases (vaccine-preventable diseases) have been wiped out with this policy (see table on next page). As the last century drew to a close, immunization was declared the greatest public health achievement in the United States in the twentieth century.

The list of licensed and recommended vaccines has been growing, and not just for infants and children. There are now schedules from professional societies, such as the

American Academy of Family Physicians (AAFP) and the American College of Obstetricians and Gynecologists (ACOG), and public agencies (e.g., the U.S. Centers for Disease Control and Prevention–CDC and most state health departments) that indicate what vaccines should be given and when for adolescents, adults, and specific vulnerable populations.

The considerable focus on vaccines and their safety in our information-overloaded society is not surprising, with a surplus of articles in magazines, books, parenting guides, and on the Internet, and stories on radio and television. While these occasionally highlight the benefits of immunization, "No One Got Sick or Died from a Vaccine-Preventable Disease Today" is not a very exciting story, so more often the emphasis in the media is on speculation that a vaccine *caused* a health problem. Furthermore, the widespread availability of litigation and liberal tort in the U.S. has encouraged lawsuits claiming harm from vaccines. Finally, it's human nature to assume cause and effect when something bad happens, so a vaccination is an attractive target when administered before the onset of a medical condition.

Unfortunately, most of the public receives a lot of health information from lay sources rather than their physicians. Professional knowledge of immunization is grounded in science—microbiology, immunology, epidemiology, and statistics. Vaccines are licensed by the U.S. Federal Drug Administration (FDA) only when proven safe and effective. Recommendations for use are promulgated by committees of scientific experts composed of academics, clinicians, and other caregivers who are passionately devoted to our citizens' health and safety. The committees' conclusions, and the rationale for them, are shared with practicing physicians, who are the most reliable source of information for patients. This process is the foundation that has led to the conclusion that licensed vaccines are safe, and the fears that vaccines are harmful are unfounded.

Despite scientific proof and a long track record of vaccine safety, we see public policy based on junk beliefs, misinformation, fear, and mass hysteria.

Nevertheless, to address these unfounded fears, these and other groups of scientific experts have undertaken investigations

Reduction in Morbidity: Vaccine–Preventable Diseases

Disease	Maximum Cases	2004/5	Change(%)
Diphtheria	206,939	0	-100.00
Hepatitis B	200,500	17,358	-73.80
Hepatitis A	35,200	4,488	-79.33
Measles	894,134	66	-99.99
Pertussis	265,269	25,616	-87.05
Polio (paralytic)	21,269	1	-100.00
Rubella	57,686	11	-99.99
Congenital rubella syn.	20,000	1	100.00
Tetanus	1,733	34	-94.12
Hib (<5 years)	20,000	30	-99.94
Varicella	83,500	11,250	-86.53
Pneumoccocal Disease	63,933	37,775	-41.00

CDC,MMWR 54(47);1214.12/2/05,NIC,3/5/07

to determine possible relationships between vaccines and autism, asthma, diabetes, multiple sclerosis, SIDS, and other diseases. *No studies have yet established a causal link between vaccines and these diseases.* For example:

- Does hepatitis B vaccine cause SIDS (sudden infant death syndrome)? Looking at the numbers of doses of the former administered and cases of the latter, one would conclude the opposite, that hepatitis B vaccine prevents SIDS, since 90 percent of U.S. children have received hepatitis B vaccine, and SIDS cases have dropped dramatically in the past decade (probably due to the American Academy of Pediatrics [AAP] recommendation that infants sleep on their backs).

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- Does MMR vaccine cause autism? This question received extraordinary attention after it was raised in an article in *The Lancet* in 1998, by Dr. Andrew Wakefield and colleagues. The co-authors and *The Lancet* both have since retracted the article and its conclusions, and Wakefield is currently on trial in the U.K. for conflict of interest at the time of its publication. (He was on retainer from lawyers suing for vaccine damages.) More important, an Institute of Medicine (IOM) expert panel evaluated the issue and concluded that the evidence favored rejection of a connection between autism and MMR vaccine. Fourteen epidemiologic studies have been performed, all demonstrating the absence of a relationship between increased rates of autism and frequency of use of MMR vaccine. It is unfortunate that the speculation of a relationship between MMR vaccine and autism has resulted in the occurrence of vaccine-preventable diseases (especially measles) in children whose parents refused to allow them to receive the vaccine and has diverted atten-

Recommended Immunization Schedule for Persons Aged 0–6 Years—United States, 2007

VACCINE ▼ / AGE ▶	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B	HepB	HepB			HepB				HepB Series		
Rotavirus			Rota	Rota	Rota						
Diptheria, Tetanus, Pertussis			DTaP	DTaP	DTaP		DTaP				DTaP
Haemophilus influenzae type b			Hib	Hib	*Hib*[4]	Hib		Hib			
Pneumococcal			PCV	PCV	PCV	PCV				PCV / PPV	
Inactivated Poliovirus			IPV	IPV	IPV						IPV
Influenza					Influenza (Yearly)						
Measles, Mumps, Rubella						MMR					MMR
Varicella						Varicella					Varicella
Hepatitis A						HepA (2 doses)				HepA Series	
Meningococcal										MPSV4	

Range of recommended ages

Catch-up Immunization

Certain high-risk groups

This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2006, for children aged 0–6 years. Additional information is available at http://www.cdc.gov/hip/recs/child-schedule.htm. Any dose not administered at the recommended age should be administered at any subsequent visit, when indicated and feasible. Additional vaccines may be licensed and recommended during the year. Licensed combination vaccines may be used whenever any components of the combination are indicated and other components of the vaccine are not contraindicated and if approved by the Food and Drug Administration for that dose of the series. Providers should consult the respective Advisory Committee on Immunization Practices statement for detailed recommendations. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at http://vaers.hhs.gov or by telephone: 800-822-7967.

Centers for Disease Control and Prevention. MMWR. 2006;55(51&52):Q1-Q4.

tion from research into the real causes of autism, which has been shown to have prenatal origins.

- Is thimerosal a cause of neurologic abnormalities, including autism? The preservative thimerosal, consisting of ethyl mercury, was used in multi-dose vaccine vials. At present, most infancy and childhood vaccines are supplied in single-dose vials, and all such routine vaccines are thimerosal-free. Studies to answer this question, including five epidemiologic surveys, came to the same conclusion as the MMR vaccine–autism analyses, that there is not a relationship. A pivotal study at the University of Rochester quantifying thimerosal in childhood vaccines stated that administration of vaccines containing thimerosal does not seem to raise blood concentrations of mercury above safe levels in infants.

Many of us recall that only two generations ago we had schoolmates who limped or had withered arms due to the paralytic polio they were infected with. That disease is now extinct in the U.S. because of the universal use of polio vaccine. During my training, I cared for children made deaf from measles, infants blind and retarded from rubella, and those who died from bacteria like pneumococcus and meningococcus. With vaccination, those conditions no longer occur. As a physician in my early years of practice, the threat of infection with bacteria called Haemophilus influenza type B (Hib) loomed large for my patients and their families, the outcomes of brain damage or death being distinct possibilities. A vaccine was invented, adopted as policy, and given to U.S. infants and children. I'm pleased to say I no longer worry about Hib infection.

Despite scientific proof and a long track record of vaccine safety, we see public policy based on junk beliefs, misinformation, fear, and mass hysteria. In 2006, a number of legislative bodies passed, and executives signed, bills prohibiting use of vaccines containing thimerosal. From a practical perspective, these restrictions mean little, since all but a few influenza vaccines do not contain thimerosal. But such policies send a bad message: that the vaccines that have virtually eradicated many diseases, constituting one of the greatest public health accomplishments of the past century, are dangerous. Furthermore, these policies denigrate our informed medical and scientific communities. This is a disservice to our citizens and endangers us all. □

Recommended Immunization Schedule for Persons Aged 7–18 Years—United States, 2007

VACCINE ▼ / AGE ▶	7–10 years	11–12 YEARS	13–14 years	15 years	16–18 years
Tetanus, Diptheria, Pertussis		Tdap	Tdap		
Human Papllomavirus		HPV (3 doses)	HPV Series		
Meningococcal	MPSV4	MCV4	MCV4	MCV4[3]	
Pneumococcal	PPV				
Influenza	Influenza (Yearly)				
Hepatitis A	HepA Series				
Hepatitis B	HepB Series				
Inactivated Poliovirus	IPV Series				
Measles, Mumps, Rubella	MMR Series				
Varicella	Varicella Series				

Range of recommended ages

Catch-up Immunization

Certain high-risk groups

This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2006, for children aged 7–18 years. Additional information is available at http://www.cdc.gov/hip/recs/child-schedule.htm. Any dose not administered at the recommended age should be administered at any subsequent visit, when indicated and feasible. Additional vaccines may be licensed and recommended during the year. Licensed combination vaccines may be used whenever any components of the combination are indicated and other components of the vaccine are not contraindicated and if approved by the Food and Drug Administration for that dose of the series. Providers should consult the respective Advisory Committee on Immunization Practices statement for detailed recommendations. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at http://vaers.hhs.gov or by telephone: 800-822-7967.

Centers for Disease Control and Prevention. MMWR. 2006;55(51&52):Q1-Q4.

Interview with Roy Richard Grinker

Author of Unstrange Minds: Remapping the World of Autism

BENJAMIN RADFORD

There are many myths and much pseudoscience surrounding the diseases now called autism. Some have to do with vaccines, as the pieces by Steven Novella and Richard Judelsohn discuss in this special section. Other myths include the long-discredited practice of facilitated communication, in which "facilitators" help illiterate autistic children type out words and sentences—as well as occasional unfounded accusations of abuse. Yet many myths and questions remain, especially related to the prevalence and underlying diagnosis of autism.

In a new book on autism, Roy Richard Grinker (a professor of anthropology at George Washington University and himself the parent of an autistic daughter) examines the disease from a social and anthropological perspective. Here is an interview based on his book *Unstrange Minds: Remapping the World of Autism.*

How did you first become interested in the subject of autism?
I wear two hats. I am an anthropologist and the father of a child with autism. So, as autism awareness grew, more and more people said, "So you're an anthropologist, what does autism look like in other cultures? Is the prevalence the same as it is here? What do people do about it?" I wrote *Unstrange Minds* so that people can see that autism is universal and that autism awareness is increasing everywhere in the world. But the most important reason for writing the book—though this was not my original intention—was to tell the world a simple message: the increase in autism diagnoses is not a crisis but rather evidence that we're finally beginning to address a kind of human difference that has for too long been misunderstood, misdiagnosed, and mismanaged. More than six decades after autism was first described by Leo Kanner, we're finally getting it right, and counting it right.

Why do you challenge the idea that autism is an epidemic?
Because so many Americans and Europeans are in a panic that there is a true epidemic, and that if there is an epidemic there must be some new, identifiable cause out there somewhere to be found and eradicated. I thought I could articulate some of the cultural and scientific reasons behind the increase in rates and give a positive message: the higher rates are due to positive changes in the way we understand and treat neurological and psychiatric disorders.

If autism is not an epidemic, how did it come to be viewed as one?
Autism became viewed as an epidemic for the same reason there have been fears of epidemics of other illnesses: there is a dramatic increase in prevalence. But prevalence is just the number of cases counted at a particular point in time and is not evidence of true increases in a disease. The same happened with melanoma and prostate cancer. There were huge increases in prevalence in those diseases, because they were being diagnosed so much more (skin cancer, due to increased awareness and more biopsies of early stage cancers; prostate cancer because of the invention of the PSA blood test, as opposed to the painful method of inserting a tool through the tip of the penis all the way to the prostate). It really is confusing to see diagnosis rates of three or four in ten thousand twenty years ago change to rates of 1 in 150. On the surface it sounds frightening.

Benjamin Radford has investigated ghosts, psychics, lake monsters, UFOs, mass hysterias, and many other paranormal phenomena for over a decade. He is the author or co-author of three books; his latest (with fellow investigator Joe Nickell) is Lake Monster Mysteries: Investigating the World's Most Elusive Creatures. *His Web site is at www.RadfordBooks.com.*

So it's the public's lack of understanding about the methodology?

I think scientists have not done a good job of explaining to the public that comparing these rates is like comparing apples and oranges. The rates in, say, 1980, were derived using a narrow definition of autism and using administrative statistics (mostly numbers of kids enrolled in programs under the category of "autism") at a time when autism was not a popular diagnosis. Today's rates are derived using a very broad definition of autism (people from the severely mentally retarded to people who marry and hold jobs and may even be college professors) and using reliable and valid measurements that have only recently been developed.

In Korea, where I'm doing an epidemiological study, we cannot even try to use administrative statistics, because autism is unpopular as a diagnosis. If you used the enrollment figures, you'd think autism was almost nonexistent in Korea. Yet, we're finding rates not out of line with the rest of the world. Second, the increased awareness has meant that people see autism more—the decreased stigma has helped too, since people don't hide their kids anymore. So it feels like an epidemic. But a feeling is different from science.

So what accounts for the apparent increase in the prevalence of autism?

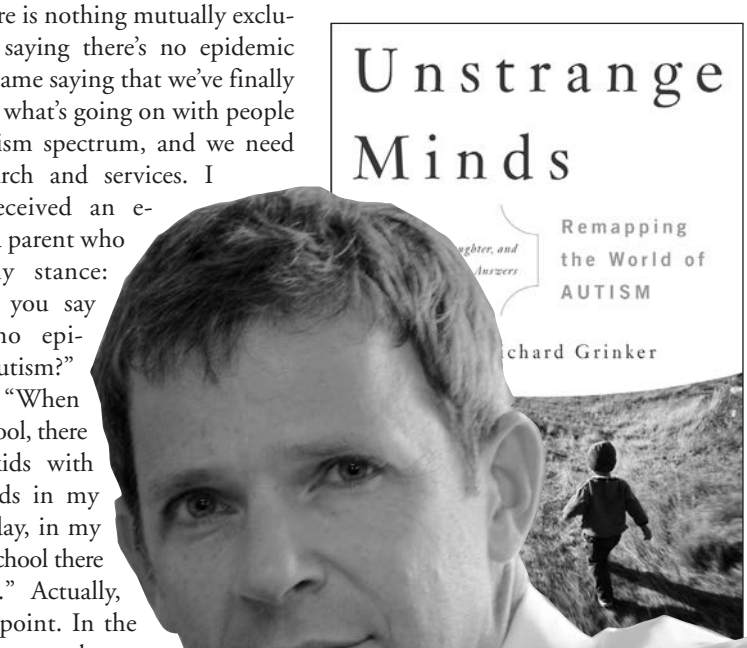
They are described carefully in my book: new epidemiological methods yield many more cases; a much larger number of people are being diagnosed with autism today because autism is a spectrum that can include the profoundly mentally retarded person but also a brilliant scientist; more and more physicians are giving the diagnosis and then kids are being coded in the school system with autism (some epidemiologists who do records-based research then rely on the school records for their information); people who were once called mentally retarded or schizophrenic or a host of other things are now being diagnosed with autism. There is no single factor among all of these that trumps the others, but I think the least understood is the change in epidemiological methods.

What do you think are the biggest misconceptions that the public has about autism?

One misconception is that we need to have an "epidemic" to call attention to a disorder. Some parents and philanthropic organizations have called me a traitor and accused me of betraying the autism community. On the one hand, I don't agree with the way philanthropic organizations have fueled the fears of an epidemic. An epidemic is a useful fiction for fundraising. On the other hand, the organizations do so much for autism awareness, research, and services that sometimes I feel a little guilty, as if by telling the truth some people might be less likely to give money. But that guilt is fleeting.

The reality is that (1) the higher rates mean that autism is a bigger public health issue than we ever realized; and (2) there is nothing mutually exclusive about saying there's no epidemic and at the same saying that we've finally figured out what's going on with people on the autism spectrum, and we need more research and services. I recently received an e-mail from a parent who decried my stance: "How can you say there is no epidemic of autism?" she wrote. "When I was in school, there were no kids with special needs in my school. Today, in my daughter's school there are dozens." Actually, that is my point. In the past autistic people were not included in our schools. Today they are. And that's a very good thing.

Another big misconception is that autism is somehow new. I am frequently asked: If there is no epidemic, then where are all the adults with autism? The answer is easy, but also complicated. Finding adults with autism is very hard, not because they do not exist but because they are dispersed in our society. Some live in group homes, others in institutions, others are living and working among us in our everyday lives. Kids are easy to count because they are all in school, neatly recorded in school records. But adults are a different story. Counting adults with autism would be like trying to count adults with speech and language disorders. You can count kids, but where would we find the adults? So many people with speech and language disorders don't get speech services as adults—they've learned to adjust, adapt, and manage. No one "missed" or "ignored" autistic people in the past. They were just called something else, or in some cases (like people with Asperger's) called nothing at all.



An additional misconception is that an environmental factor equals an environmental toxin. Environment probably plays some very small role in causing autism, but environment can mean everything in the world, from chemicals, to our diet and way of life. No environmental factor has yet been identified by scientists to account for autism, let alone changes in autism prevalence. Looking for environmental factors in autism at this stage in our knowledge is really like looking for needles in haystacks.

Why do you think the news media have engaged in such misleading and alarmist coverage about autism?

Fear, panic, and deep parental concern get a lot of attention. Compare the two messages: "There's an epidemic and we don't know what is causing it!" and "More people are being diagnosed with autism today because we understand it better." Plus, autism in the news is usually about autism in children (despite the fact that autistic children grow into adults), and children are very engaging as television, radio, and newspaper subjects. Advocacy by organizations whose membership is convinced there is an epidemic caused by an environmental toxin has been well funded and supported by politicians, especially by politicians in the states with the most autism services (and hence, because of those services, the highest rates of diagnosis).

What has been the reaction to your book, both by medical professionals and by parents of autistic children?

The scientific community, from what I can tell so far, supports my work strongly (e.g., reviews in *Nature* and the *New England Journal of Medicine*). Much of what I'm saying about the reasons for the so-called epidemic has been said before in scientific journals. What I've done is to put all those arguments together and place them in a larger context of American social change in a way that is accessible to a wide audience. The fact that the book is being reviewed in both scientific journals and in the popular press, such as *People* magazine, is an indication to me that I've succeeded in reaching a large readership. Among parents of children with autism, the reception has been mixed. Many, many parents find *Unstrange Minds* to be inspiring because I talk about how many families in the world have turned something potentially devastating into something uplifting and rewarding. Others have sent me hate mail and left angry telephone messages on my answering machine at work. I have been called every kind of name.

What does the science suggest are the causes of autism?

There are probably several different kinds of autism caused by several different genetic pathways. There may be, in total, several dozen different genes involved. Scientists at Cold Springs Harbor Laboratory in New York have generated one of the most interesting genetic models, suggesting that some cases are heritable, but usually over the span of a couple of generations through a nonaffected carrier, and other cases are *de novo* mutations. But the bottom line is: it is largely genetic, so much so that environment probably plays [only] a small role. One way scientists estimate the role of genetics in a certain disorder is to look at concordance of that disorder in identical twins, that is, two people with identical DNA. The concordance, or percentage of people with identical DNA who both suffer from an autism spectrum disorder, is as high as 90 percent in some studies. That's higher than the concordance for coronary artery disease, depression, or breast cancer. Then, when the scientists look at fraternal twins, who don't have the same DNA, they find a concordance as low as 0 percent and as high as 10 percent. That makes ASD strongly genetic.

If autism is partly genetic, should there be prenatal testing to determine if a fetus is autistic?

That is a huge ethical question, but perhaps it's premature. We know that schizophrenia, bipolar disorder, breast cancer, and many other disorders have a strong genetic component, but they cannot be tested for in the womb. Multigenic complex disorders are very different from, say, Down syndrome, which is an identifiable mutation in which there is extra genetic material (a twenty-first chromosome), so it can be tested for. Autism is a totally different kind of condition.

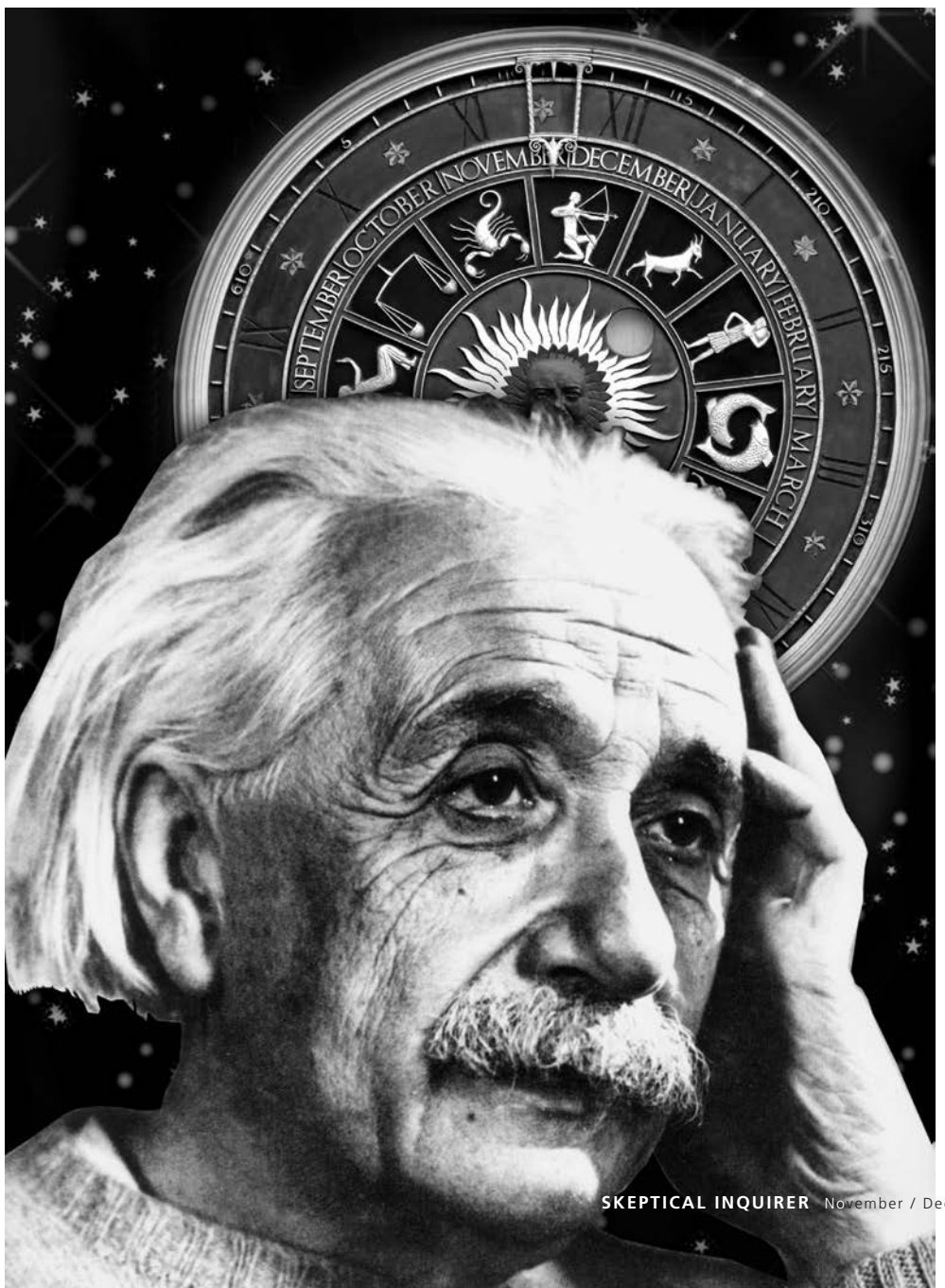
In explaining how disease diagnosis is culturally dependent, you draw from many cultures and countries, including the Navajo and family lines in China and Peru. What are two of the most vivid examples in your mind?

The Korean case is one of the most fascinating to me. This is a country in which scientists and doctors and government officials have said that autism is a rare or nearly nonexistent disorder in Korea. The school and clinic records support that contention, because one seldom finds any mention of anyone with "autism." Autism, when it is diagnosed, is highly stigmatizing because it is seen as a genetic disorder. If a disorder is genetic, the family feels that the entire family is damaged, and this brings shame and stigma. So parents would rather see themselves as bad parents who caused autism in their child through bad parenting than see the disorder as genetic. This is the opposite of what happened in the U.S., where mothers and fathers used to be blamed, but we now see the disorder as genetic. At any rate, I went into Korea with a team of epidemiologists and psychiatrists and psychologists, and we have screened thirty thousand kids and done extensive testing. And we're finding lots of autism. The kids just are not called autistic. They are undiagnosed or diagnosed with something else. So, in Korea, we're seeing a culturally different version of what has already happened in the U.S. and higher prevalence rates in Korea are on their way: not because autism is new as a condition, but because autism is new as a concept. □

The End of the Einstein-Astrology-Supporter Hoax

Astrology books and Web sites often describe Einstein as favorably regarding astrology. Einstein, however, was known for his negative opinion on the topic. Who, then, is responsible for this hoax?

DENIS HAMEL



In the past it never occurred to me that every casual remark of mine would be snatched up and recorded. Otherwise I would have crept further into my shell. (Calaprice 2000)

I dislike very much that my children should be taught something that is contrary to all scientific thinking. (Frank 2000)

It is difficult to say what truth is, but sometimes it is so easy to recognize falsehood. (Calaprice 2000)

—Albert Einstein

Books and Web sites on astrology often boast a quote suggesting that Albert Einstein thought favorably of astrology. However, his negative opinion of astrology is documented. If Einstein had no interest in astrology, then who is responsible for having forged this hoax?

The year 2005 marked the hundredth anniversary of the publication of three seminal discoveries, among them the theory of relativity, made by an unknown clerk working at the Bern patent office. It also marked the fiftieth anniversary of the clerk's death.

In 1919, during a total eclipse of the Sun, a phenomenon that was predicted by this theory—the deviation of a light ray due to the mass of a huge body (in this case, the Sun)—was verified for the first time. Under the supervision of Arthur Eddington, a team of astronomers aimed their telescopes in the direction of the Sun, took pictures of the surrounding sky at totality, and compared the positions of the stars close to the limb of the Sun with pictures of the same area of the sky taken at a different time. The measured shift in the position of stars near the Sun corresponded perfectly with the shift predicted by the theory of relativity. As soon as Eddington published his results, Albert Einstein was catapulted to his position among the greatest scientists of all time, taking his place beside Galileo and Newton.

To count Einstein among the supporters of esotericism in general, and of astrology in particular, would be quite a coup for adepts of those pursuits. Unfortunately for them, Einstein's opinion of astrology was clear—and has been published. Nonetheless, if you open a recent book on astrology, you may find a chapter containing a list of celebrities, writers, kings, popes, artists, and the like who endorse astrology. Among them you surprisingly, if not incredulously, may find the name of Albert Einstein, along with this quote he is alleged to have said:

> Astrology is a science in itself and contains an illuminating body of knowledge. It taught me many things and I am greatly indebted to it. Geophysical evidence reveals the power of the stars and planets in relation to the terrestrial. In turn, astrology reinforces this power to some extent. This is why astrology is like a life-giving elixir to mankind.

The same quote appears on many astrology Web sites. With a search engine, just typing "Albert Einstein astrology is a science in itself" will find dozens of sites posting the phrase.

Even at first glance, this sentence contradicts views Einstein espoused on the error of teaching "something that is contrary to all scientific thinking"—which would include astrology. I have gathered convincing information pinpointing the possible author of the false phrase attributed to Einstein.

The Swiss-born Canadian astrologer Werner Hirsig introduced the text as an epigraph to his *Manuel d'astrologie* published in Quebec, Canada, in 1965. However, at the end of his book, a postscript mentions the following: "On the banks of Leman Lake, February, 1950."[1] From this, some have incorrectly assumed that the *faux* quote had been introduced as early as 1950.[2] After some research on the Web and in various library indexes, I found that Hirsig had written a book in 1950 titled *Astrologie moderne (Modern Astrology).* Thanks to an interlibrary loan system, I obtained a copy of the book from Switzerland and realized that the *Manuel d'astrologie* of 1965 was a reprint of this book. Differences between the two documents are minor, as both books have the same table of contents and pagination. Only the prefaces are different. In the 1965 version, a foreword is added where the sentence attributed to Einstein is introduced for the first time in Hirsig's book. Indeed, I would have been surprised if Hirsig had introduced the quote in a book published while Einstein was still alive.

I contacted Hirsig's former wife, Ms. Huguette Hirsig, to ask her if she knew the source used by her ex-husband, particularly as she had used the same quote in one of her books on astrology, *Prévisions astrologiques mondiales* (1993, p. 15). Unfortunately, she could not enlighten me and instead referred me to a former collaborator of her husband who, as it turned out, also did not know the origin of the quote.

Pursuing my research, I came across a vast compilation of all the unpublished manuscripts, notes, letters, etc. of Einstein, *The Collected Papers of Albert Einstein.* Alice Calaprice, the co-editor of this monumental work, read or perused all documents eventually reproduced in the collection, of which nine tomes of four hundred pages each have been released to date. Each book ends with an index—in which the word *astrology* is conspicuously absent. As a by-product of her work, in 1996 Calaprice published a book comprising quotes by Einstein on various topics (religion, science, politics, etc.). The book, *The Quotable*

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Einstein, has a section including sentences "attributed to Einstein." But still, no trace of the astrology quote.

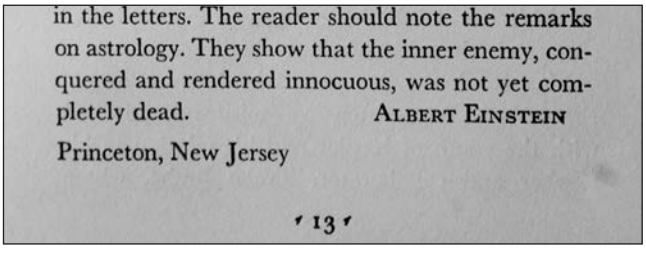
I contacted Calaprice and, with her permission, here are some excerpts of her reply:

> I can't believe that Einstein believed in astrology, and I wasn't aware that he is being quoted on it until I received an e-mail from someone about it over a year ago, and now your letter. . . . Many quotations are attributed to Einstein to give them credence, and one shouldn't believe all of them. . . . But if he were a believer in astrology, I think it would have been apparent *somewhere* in his writings or letters, and I've never come across even a mention of the word.

Calaprice referred me to a book by Einstein as a possible source for the alleged quote, *Cosmic Religion and Other Aphorisms*. I read that short book (twice) and of course, there was no trace of the quote. In fact, in *Cosmic Religion* Einstein is quoted as saying, "By furthering logical thought and a logical attitude, science can diminish the amount of superstition in the world" (Einstein 1931, p. 98).

I was able to tell Calaprice that the word *astrology* had most likely been used only on one occasion in print by Einstein, and then it was in order to excuse Kepler for having practiced astrology extensively throughout his life as a means to earn a more decent living. In 1951, Einstein wrote an introduction to Carola Baumgardt's 1951 book, *Johannes Kepler: Life and Letters, with an Introduction by Albert Einstein*. The last sentence of his introduction reads as follows:

> The reader should note the remarks on astrology. They show that [for Kepler] the inner enemy, conquered and rendered innocuous, was not yet completely dead.



in the letters. The reader should note the remarks on astrology. They show that the inner enemy, conquered and rendered innocuous, was not yet completely dead.

ALBERT EINSTEIN

Princeton, New Jersey

' 13 '

It was then obvious that the other quote so popular in astrological circles could not possibly have been written by Albert Einstein.

Shortly after its publication in 2000, I purchased *The Expanded Quotable Einstein*. It is with some satisfaction that I realized that Calaprice took into account my communication to her. She created (on page 272) an entry for astrology and reproduced the real opinion of Einstein on the subject, as the "inner enemy." She also put the false quote that astrologers are so fond of on pages 320–321, in the section "Attributed to Einstein" noting it as "an excellent example of a quotation someone made up and attributed to Einstein in order to lend an idea credibility. Yet several people have asked me to confirm it."

From June 2001 onwards, I endeavored to contact more than one hundred Web masters I found posting the false quote on their sites either in English, French, or German. Many among them did not even reply to my messages. Others did with classic arguments against "official science" that cannot explain many

How can you be correct so often, Dr. Einstein?
You have to choose the right tea leaves . . . and apply the principles of relativi-tea.
Your Future through Tea Leaves
Berne • Zurich
Prague • Berlin
Princeton
1951 Einstein Tour
Cosmic Religion

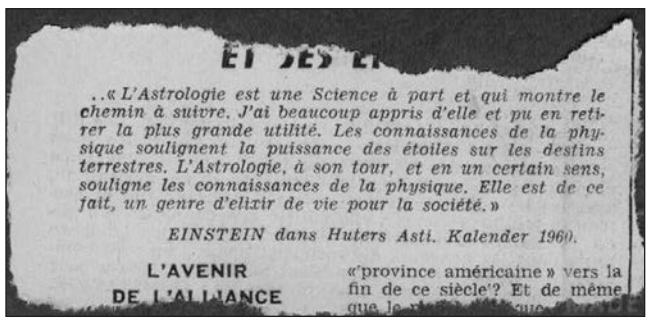
Cartoon designed by Louis Dubé, editor of *Québec Sceptique* magazine from a concept by Denis Hamel.

esoteric phenomena, for example citing the Heisenberg Uncertainty Principle. A French astrologer even told me the following: "If this sentence is going around the world with Einstein's signature, it is the proof that he at least meant it." However, several people showed some open-mindedness, as with a Canadian astrologer posting on her Web site the following:

> It's time astrologers started being a little more intellectually honest and careful where it comes to arguments we offer in support of Astrology. I have removed two quotes from my quotation page because I have reasonable doubts that they are accurate. These two quotes, by Einstein and Newton, are among the most quoted remarks in support of astrology by recognized scientists but no-one can tell us where they come from. They don't seem to be in any of the historical records of these two scientists. I recently received a letter about them that goes into great detail on the subject.[3]

The Origin of the Hoax

A French astrologer removed the false quote from his Web page after having consulted with André Barbault, one of the most respected French astrologers. The latter recommended he not use it anymore. In July 2002, I contacted Barbault on the subject and provided him with the actual opinion of Einstein on astrology: the "inner enemy" of Kepler. Here are some excerpts of his reply: "Thank you for this convincing documentation on Einstein. I always advised people around me against quoting this sentence as it did not fit Einstein's character."



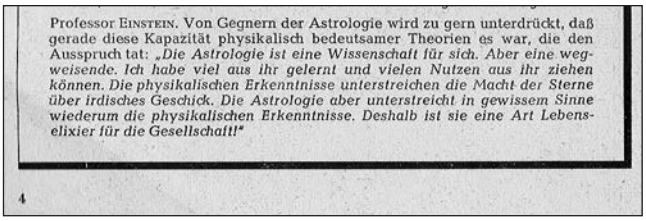
..« *L'Astrologie est une Science à part et qui montre le chemin à suivre. J'ai beaucoup appris d'elle et pu en retirer la plus grande utilité. Les connaissances de la physique soulignent la puissance des étoiles sur les destins terrestres. L'Astrologie, à son tour, et en un certain sens, souligne les connaissances de la physique. Elle est de ce fait, un genre d'élixir de vie pour la société.* »

EINSTEIN dans Huters Asti. Kalender 1960.

L'AVENIR DE L'ALLIANCE

«province américaine» vers la fin de ce siècle»? Et de même

French version of the quote and its source, the *Huters astrologischer Kalender* of 1960 as provided by André Barbault.



Professor EINSTEIN. Von Gegnern der Astrologie wird zu gern unterdrückt, daß gerade diese Kapazität physikalisch bedeutsamer Theorien es war, die den Ausspruch tat: *„Die Astrologie ist eine Wissenschaft für sich. Aber eine wegweisende. Ich habe viel aus ihr gelernt und vielen Nutzen aus ihr ziehen können. Die physikalischen Erkenntnisse unterstreichen die Macht der Sterne über irdisches Geschick. Die Astrologie aber unterstreicht in gewissem Sinne wiederum die physikalischen Erkenntnisse. Deshalb ist sie eine Art Lebenselixier für die Gesellschaft!"*

4

Source of the hoax: Quote in German from the 1960 edition of the *Huters astrologischer Kalender*.

Barbault kindly provided me with an old, yellowing clipping containing a French translation of the quote. The source provided in the document is the *Huters astrologischer Kalender* of 1960. By searching on the Web, I found that the *Huters* is a yearly astrological periodical.

Due to this new information, I had to revise my theory on the actual source of the hoax. I obtained a copy of the 1957 to 1960 editions of the *Huters* from a German bookshop. Indeed, the fake quote had appeared on page four of the 1960 edition (released at the end of 1959), but not in previous editions.

Cover page of the 1960 edition of the *Huters astrologischer Kalender*.

This new information proves that Hirsig could not have been the source of the original hoax. In his book of 1962, *Votre destin par l'astrologie* (*Your Destiny through Astrology*), Hirsig did quote the great French writer Honoré de Balzac on the subject of astrology, using a phrase whose beginning is identical to the one *attributed* to Einstein: "*Astrology is a* huge *science* and which did reign over the greatest minds" (Balzac 2000).

It seems he would definitely have included Einstein's quote alongside Balzac's if he had been the author of the false quote, or even aware that the quote existed. As Barbault collaborated with Hirsig in the 1940s,[4] I contacted him to verify his opinion as to whether Hirsig could have been the author of the quote. He replied with the following: "It looks quite unlikely that Hirsig could have created such a forgery . . . Hirsig was an honest and sober man. It is most likely that we should incriminate a crank astrologer—there are so many among them—Hirsig's responsibility having been to take seriously that person by publishing his/her text."

I asked a friend whose mother tongue is German to check the language of the *Huters*' quote to find out if it was proper German (and so likely to have been originally written in German) or a bad translation into German from a foreign language. She confirmed that the text was indeed in "good German." It is interesting to note that there is only one German version of the quote. However, two versions of the French translation exist, and the version mainly disseminated in esoteric literature is the one used by Hirsig.

Relativi-tea

Given the evidence I've shown above, it is obvious that the phrase so popular among astrologers is an invention, and one most likely put forward by Carl Heinrich Huter. From reading his yearly almanacs, it's quite clear that he did not work with collaborators. As I've noted above, Einstein had a negative opinion on astrology, which he characterized as an "inner enemy" of Kepler.

However, if one absolutely wishes to link Einstein with the world of esotericism and soothsayers, I recommend reading an article that Einstein published in 1926 on the "cause of meander formation" according to Baer's law. It provides a scientific explanation for the fact that rivers from the northern hemisphere tend to dig banks to their right sides, whereas rivers in the southern hemisphere erode their left sides. To illustrate the forces involved in this process, taking into account the turmoil generated in the current with the shape of the rivers, Einstein used the example of a tea cup stirred with a spoon. "The rotation of the liquid causes a centrifugal force to act on it. But in the neighborhood of the walls of the cup the liquid is restrained by friction, so that the angular velocity with which it rotates is less there than in other places nearer the center. In particular, the angular velocity of rotation, and therefore the centrifugal force, will be smaller near the bottom than higher up."[5] This is confirmed by the accumulation in the bottom of the cup . . . of tea leaves!

Acknowledgments

The author would like to thank Ms. Marie-Annick Moreau, who kindly revised the English translation of this paper.

Notes

1. "Sur les Rives du Léman, février 1950."

2. From *Skeptic's Dictionary, Refuge Mass Media Bunk* 12 (http://skepdic.com/refuge/bunk12.html)

April 18, 2000. I received an e-mail today from Ivan Kelly, renowned expert and critic of astrology, regarding a widespread claim among astrologers that Albert Einstein once wrote: "Astrology is a science in itself and contains an illuminating body of knowledge. It taught me many things and I am greatly indebted to it."

Ivan contacted Geoffrey Dean, another renowned expert and critic of astrology, who wrote the following:

Dear Ivan, Re that Einstein quote. This is a good example of astrologers quoting each other nth hand, but with nobody ever checking the original quote.

In a letter in *Correlation* June 1991, 11(1):35–36, I chased it back to a book (in French) by the late Swiss-Canadian astrologer Werner Hirsig, *Manuel d'astrologie*, where the quote appears in French in the preface, but with no source given. From there it was quoted by Solange de Mailly Nesle (1981), from which it was quoted by Tad Mann (1987) and Percy Seymour (1988), and from there ever onwards seemingly without end.

The Hirsig book ends with a postscript dated February 1950, so the quotation must date from before that time (Einstein died in 1955). Hirsig's widow did not inherit his papers, so she was unable to check them to see if they gave the source. Various people including Solange, Percy, and myself have checked Einstein's writings and biographies but have been unable to verify it, so Solange and Percy have deleted it from later editions of their books. His biographies contain nothing to suggest Einstein had any interest in astrology, and its style differs from that of authentic Einstein sayings.

My letter ended "Accordingly, until the quote is authenticated, it should be ignored lest it add to the blight generated by Newton-Halley, Evangeline Adams, and other famous-but-wrong quotes."

Hope this helps.

Regards, Geoffrey

3. Available at www.astrology.ca/library/jasmine/quotes.html.

4. Foreword of his *Destin de l'homme* of 1943.

5. Einstein, Albert. *Ideas and Opinions*, pp. 249–250. Text published in *Die Naturvissenschaften*, vol. 14, 1926 and read to the Prussian Academy on 7 January 1926.

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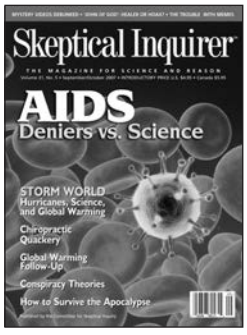

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Biodynamics in the Wine Bottle

Is supernaturalism becoming the new worldwide fad in winemaking? Here is an examination of the biodynamic phenomenon, its origins, and its purported efficacy.

DOUGLASS SMITH and JESÚS BARQUÍN

Have you visited a wine store recently? Something strange is afoot. The new fad in the vineyards is a practice called "biodynamic (BD) farming": it's big and getting noticed in the bottle. Newspaper ads now extol biodynamically grown wine next to organic wines for sale in stores. Trade and industry groups organize tastings of exclusively biodynamic wines. And dozens of wineries around the world have been certified biodynamic by the umbrella "Demeter" certification bodies. These include famous names such as France's Zind-Humbrecht, Domaine Leroy, Coulée de Serrant, Château La Tour Figeac, Domaine Huët, and Chapoutier, as well as California's Benziger and Fetzer. Indeed, according to the most complete published account of the practice so far, "Over 10 percent of France's certified organic vineyard area is now Biodynamic" (Waldin 2004, p. 111).

In addition, two of the world's most influential wine writers, Robert Parker and Jancis Robinson, have weighed in in favor of these wines.[1] Although both should be held in the highest regard for their integrity and knowledge of wine, without doubt, neither of them is in any way an expert on the biodynamic movement. They have, at times, expressed the desire to remain neutral. But, at other times, they show themselves all too ready to accept its pretensions.

Parker, arguably the most powerful and influential wine critic alive today, is a man whose yearly reviews help set the prices of each Bordeaux vintage. In his most recent book, he refers with clear affection to wineries that utilize biodynamic practices. For example, he extols Catherine and Sophie Armenier, owners of a Rhône Domaine, as "following the astrological/homeopathic writings of the famed German professor Rudolf Steiner" (Parker 2005, p. 380). In this context, it is perhaps no surprise that Parker has also publicly declared that he is himself applying biodynamic methods to part of the Beaux-Frères vineyard in Oregon that he owns along with his brother-in-law.[2]

England's Robinson is one of the leading wine essayist of her generation. She is one of the few Masters of Wine in the world, with an armful of publication credits including the *Oxford Companion to Wine* and the *World Atlas of Wine*, dozens of awards, and hundreds of articles. She also has published claims that BD works (Robinson 2005).[3] Confronted with a skeptical rejoinder, she responded, "If producers are happy with, if mystified by, the results—why not let them continue? Perhaps you could explain what harm they do."[4]

Biodynamic winemaker Nicolas Joly holds a glass of "Clos de la Coulee de Serrant" January 17, 2006, as he stands beside a 16th-century wine press in Savennieres in the Anjou region of western France. Joly is seen as the patron saint of biodynamic winemaking. Photo credit: Frank Perry/AFP/Getty Images) [Photo via Newscom]

She asks a fair question. To start with, what exactly is biodynamics? It is a method of organic agriculture admixed with some odd extras. These additional methods include taking into account cycles of the moon and relative positions of the zodiacal constellations when farming, as well as applying different sorts of homeopathic or esoteric "preparations" to the vineyard soil. These and other similar pretensions are set against a complex background cosmogony that makes the whole process not unlike a quasi-religious movement.

Steiner's Fancies

Biodynamics began with a series of lectures in June of 1924 by the Austrian occult philosopher Rudolf Steiner. Steiner had a vitalist vision of the universe in which "ethereal" qualities infuse raw matter in order to give it life; this distinguishes living things from mere amalgamations of chemicals, however complex. The potential conflict with modern biochemistry should be clear. At any rate, he saw his program reintroducing "spiritual" elements into farming. Indeed, his ideas were to create an entire crank "Spiritual Science" that would illuminate the connections between such spiritual properties as the "ethereal" or the "astral" and chemical elements like oxygen, sulphur, carbon, and nitrogen.[5] For example, "the ethereal moves with the help of sulphur

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along paths of oxygen," (Steiner 2004, p. 46). Needless to say, no experimentation was done to discover these "facts." Throughout, Steiner used his favored methodology: armchair philosophizing and guesswork, which in his case he considered quite literally clairvoyant.

His agricultural lectures included a number of concrete suggestions for so-called preparations to be added to the field or compost, many done with one eye on the astrological star-charts. According to the present-day Demeter certification bodies, a farm can be labeled biodynamic simply by virtue of being organic and adding the preparations in sufficient quantities (Waldin 2004, p. 73). Hence, it would be good to return to the original treatise to investigate the preparations, and their accompanying justification, to see what they are and why they are prescribed.

Steiner's agricultural lectures are, to put it mildly, not an easy read. They are marked by clear falsehoods, digressions, and odd fantasies. He recommends such techniques as combating parasites "by means of concentration, or the like" (Steiner 2004, p. 84). He says that certain insect pests are spontaneously created by "cosmic influences" (p. 115) and that eating potatoes "is one of the factors that have made men and animals materialistic" (p. 149). He tells us, "most of our illnesses arise" when our "astral body" is "connected more intensely with the physical (or with any one of its organs) than it should normally be" (pp. 116–17). In contrast, "in the true sense of the word a plant cannot be diseased"; plants only appear to be diseased when "Moon-influences in the soil . . . become too strong" (pp. 117–18). He also describes baroque fantasies of a human history that spanned "epochs . . . on the earth when such things were known and applied in the widest sense"[6] (p. 120). And on and on, *ad nauseam*. It is good to keep this material in the back of our minds when considering his forays into agriculture.

Steiner proposes his "preparations" in lectures four and five: various small constructions to be added to the field or compost at various times of the year, such as the burial of a cow's horn filled with manure (now called Preparation 500) or filled with powdered quartz (Preparation 501), burial of yarrow flowers in a stag's bladder (502), chamomile in a cow's intestine (503), oak bark in the skull of a domestic animal (505), or dandelions in a "bovine mesentery" (506) (Steiner 2004, pp. 72–99).

Adding the preparations can be a labor-intensive process, especially since some preparations must be done in quantity, depending on the size of one's fields. Farmers may well wonder: why go to all the effort? What sort of justification does Steiner provide? Let us take the case of Preparation 502. Yarrow is used because, "Its homeopathic sulphur-content . . . enables the yarrow to ray out its influences to a greater distance and through large masses." As for why we should put it in a stag's bladder, Steiner gets to the heart of his discussion here:

> The bladder of the stag is connected . . . with the forces of the Cosmos. Nay, it is almost the image of the Cosmos. We thereby give the yarrow the power quite essentially to enhance the forces it already possesses, to combine the sulphur with the other substances. (Steiner 2004, p.93)

Why the concern about sulphur in particular? We are expected to remember that "the ethereal moves with the help of sulphur along paths of oxygen" and the like. In other words, sulphur is a key ingredient for receipt of ethereal forces. Or so the story goes. But, at any rate, we don't need to test the reader's patience with a complete exegesis to make clear that Steiner has given no justification whatever for this practice. Indeed, Preparation 502 is actually one of the better examples, since many of his others are simply stated without the slightest attempt at explication or justification. But it is all of a piece: in the preface to the book of agricultural lectures, written by one of Steiner's pupils, we find the surprising claim that "In 1923 Rudolf Steiner described for the first time how to make the bio-dynamic compost preparations, simply giving the recipe without any sort of explanation—just 'do this and then that'" (p. 5). Apparently the explanations, such as they were, came later.

If these "preparations" are intended to fertilize the soil, other suggested biodynamic rituals are meant to rid the fields of pests and diseases. For weeds, insects, and rodent pests Steiner suggests the practice now referred to as "ashing." Let us say we have a biodynamic farm and are plagued with field mice. Steiner directs us to "catch a fairly young mouse and skin it . . . at a time when Venus is in the sign of Scorpio" (p. 113). Then we are told to burn the skin and scatter the ash over our fields. Steiner assures us that "Henceforth, your mice will avoid the field." Insects and weeds are treated in similar fashion, except that one does not need to skin (shell?) the insect: only "where there is spinal marrow, you must first skin the animal," he sagely tells us (p. 121). Steiner doesn't ever clarify what the spinal marrow has to do with anything.

To rid biodynamic fields of plant diseases such as rot and mildew (or, since Steiner does not believe plants can be diseased, to rid them of his so-called Moon influence), Steiner suggests "a homeopathic dose" of horse tail (equisetum arvense) infused into water, diluted, and sprayed over the fields (p. 118).

With this list of practices, best described as rituals of a sort of agricultural voodoo, we are at the heart of biodynamics. For although they have been extended a bit by more modern believers, the practices still retain much of the flavor that Steiner intended. We encounter the same esoteric rituals intermixed with homeopathic dilutions and astrology when reading present-day accounts of biodynamics (Waldin 2004, Joly 1999, and Thun 2000). Indeed, if anything, biodynamic practices have gotten even more esoteric. Now we can also read about using "standing stones" to do "geo-acupuncture" in order to "restore the cosmo-telluric balance" of a vineyard, directed by "a specialist with the aid of a pendulum" (Chapoutier 2006).

It is perhaps superfluous to go through the arguments contradicting the effectiveness of such practices as homeopathy, astrology, or manipulations of esoteric energy fields. They have been debunked many times long before now. However, it does at least bear repeating that homeopathic doses are generally diluted by water until not a single molecule of the original material persists in solution. In other words, a "homeopathic dose" is most likely nothing but water. Although originally suggested as a cure for disease, extensive testing has shown that homeopathic cures perform no better than a placebo in humans (Ernst 2002 and Shang et al. 2005). And, while water may be of some obvious

benefit to plants, it is unlikely to provide much of a cure for rot and mildew, Moon influence or no.

Research Findings

In reviewing the founding documents of biodynamics, one is not particularly reassured as to its bona fides. Biodynamics was not developed from any sort of trial-and-error experimentation or expert guidance. Indeed, the theory is barely comprehensible, relying as it does on a variety of strange, clearly false, and anti-scientific claims. However, even so, the practice might work. The only way to know for sure is to do the actual research. Fortunately, such research has been carried out at a number of universities and laboratories around the world. Unfortunately, much of it is sloppily done, and published in not particularly well-regarded or even peer-reviewed journals.

Also unfortunately, many of the studies contrast biodynamic agricultural practices with standard, nonorganic agriculture. They go on to show that biodynamic agriculture does better than standard agriculture on some measures of soil fertility or biodiversity. These experiments prove nothing, since, as we have already seen, biodynamic agriculture must at least be organic. And it is uncontroversial that organic agriculture (shunning powerful artificial fungicides, pesticides, and herbicides) yields higher soil fertility and biodiversity than conventional agriculture.[7] What we need is a clear comparison of biodynamic and organic agriculture.

Such a test was carried out by a Swiss group, in one of the most famous biodynamic studies ever performed (Mäder et al. 2002). This was a twenty-one-year study in which biodynamic agriculture appeared to edge out even organic agriculture on a small number of measures of soil fertility and biodiversity. However, the study was not without its problems: buried in the supplementary material—available online but not in the paper itself—are a number of caveats. Certain chemical treatments were added to the organic farms that were not added to the biodynamic ones. And these were only the "main differences." We aren't told what the other differences might have been. So the test appears to have been poorly designed. It does not provide us with any principled answer as to whether the biodynamic treatments were truly effective, or, rather, whether the chemical additives (or something else that wasn't deemed a "main difference") caused the organic plots to perform somewhat more poorly. The article was also criticized by one University of California at Davis microbiologist because it "looks at an 'incredibly narrow' range of ecological niches," raising the question of whether they were cherry-picked to yield the desired result (Stokstad 2002).

Lynne Carpenter-Boggs and her thesis advisor, John Reganold, both at Washington State University, have done what is perhaps the most highly regarded scientific work on biodynamics. Reganold is a sometime biodynamic consultant to the California wine industry as well as a researcher on the subject. However, even he and his former student have been unable to unearth any real differences between organic and biodynamic practices. Indeed, Carpenter-Boggs has researched precisely the question of whether composts with biodynamic preparations improve soils to which they are added. The results? "No differences were found between soils fertilized with biodynamic vs. nonbiodynamic compost" (Carpenter-Boggs 2000).[8] Reganold has said as much in a 2003 interview: research "didn't distinguish biodynamic from organic" (Darlington 2003). It could hardly be clearer.

What harm does it do if a farmer or winemaker follows such practices? The easy answer is that it is a waste of time, money, and effort.

A six-year study from the Washington State lab in 2005 was the first published in a peer-reviewed journal comparing biodynamic and organic agriculture with respect to wine grapes in particular. They found nothing. "No consistent significant differences were found between the biodynamically treated and untreated plots for any of the physical, chemical, or biological parameters tested" (Reeve et al. 2005, p. 371). Further, when they looked at the grape vines, "Analysis of leaves showed no differences between treatments. . . . There were no differences in yield, cluster count, cluster weight, and berry weight" (p. 373).[9] So, careful research demonstrates that the labor-intensive biodynamic "preparations" are simply ineffective. Yet, according to the biodynamic certification body itself, they are the heart of the practice.

One may well ask whether a properly controlled test has been done to compare biodynamic versus nonbiodynamic wines themselves. However, it will not suffice to simply pull bottles off the shelf of each sort and put them into a lineup. There are too many variables between different finished wines. Even neighboring wineries may have quite different soil and subsoil, different microclimates, and use different farming techniques in the vineyards such as vine training, leaf pulling, and so on. Different winemakers will also tend to use different techniques to process their grapes into wine and store them in different manners, for example in different kinds of barrels or stainless steel, and so on. As a result, any such test would have to be done very carefully, being sure that the soils, grapes, and wines tested were equivalent in all other controllable respects except for the additional biodynamic preparations and techniques. This would, out of necessity, consist of a test between wines produced from organically farmed grapes.

What Harm?

To return to the question posed earlier—what harm does it do if a farmer or winemaker follows such practices? The easy answer is that it is a waste of time, money, and effort. Indeed, one reason that biodynamics has caught on in the wine industry, and

practically nowhere else, is that wine is perhaps the agricultural product with the largest sales markup. Most agricultural products are commodities that roughly sell at their price of production. However, if a winemaker can convince the public that the wine he or she makes is some of the best stuff out there, he or she can charge upwards of $50 or $100 for a bottle of what is, in essence, fermented grape juice. Such a markup can pay for the onerous biodynamic overhead of labor, assuming that the marketing is done properly. But, still and all, it appears to be wasted effort, and those who persist in it appear more and more as New Age acolytes.

That said, our critical attitude toward the esoteric aspects of biodynamics does not interfere with our appreciation of many of its wines. Many biodynamic winemakers are indeed talented. The problem resides in the extension of disbelief in empirical technique, and in substituting for it beliefs in unscientific practices like astrology and homeopathy, as well as voodoo-style rituals and even "geo-acupuncture." We must confront this problem, not just as wine lovers and wine writers, but also as citizens who do not wish to live in, nor present to our children, a society in which pseudoscience and esoteric fantasies are considered reality. Irrational thinking, or reliance on mystical gurus with claims of clairvoyant intuition, does great harm to society. The best research studies to date have not found any distinction between biodynamics and the organic agriculture of which it is a part. The esoterica, it seems, add nothing. And we, as supporters of clarity and rationalism, are dismayed by the disconnect between belief and research. Our hope is that one day, under the clear light of understanding, better-grounded winemakers will dispense with biodynamics for good. Let us raise a glass to reason, and to that day.

Acknowledgments

The authors would like to thank Linda Chalker-Scott, Associate Professor and Extension Horticulturalist, Puyallup Research and Extension Center, Washington State University, for her gracious assistance.

Notes

1. In fact, three have. Matt Kramer has also recently written in favor of biodynamics in his regular column for *Wine Spectator* magazine, the largest circulation wine publication in the world. (See Kramer 2006:42).

2. Available at http://dat.erobertparker.com/bboard/showthread.php?t=62593&page=2. Parker does not like to mention his vineyard in public to reduce any appearance of conflict of interest. In this case, he resorts to coy punctuation symbols. Note that the standard abbreviation for biodynamics is "BD." "We [who] use BD on a part of @%^&# with the balance farmed organically . . . tend to agree with those who argue that it is not some clever marketing tool but rather a farmer's quest for producing better and healthier fruit and hopefully better wine . . . many top estates in the world actually operate their vineyards in similar fashion but just don't get too carried away in boasting about it. . . ."

3. The article, written for a publication in Spain, includes such claims as: "they have determined that biodynamics 'works,'" "these practices . . . procure excellent enological results."

4. E-mail communication, December 24, 2005. A similar rejoinder was made by Robert Carroll of the *Skeptic's Dictionary* when asked for help in confronting biodynamic practices, on May 2, 2000. See http://skepdic.com/comments/mooncom.html: "Frankly, if they make good wine, I don't care if they use astrology or consult James Van Praagh for advice."

5. Steiner's attempts at creating a "Spiritual Science" should remind some of us of the excesses displayed in the recent intelligent design (ID) controversy. E.g., "It is ID's project to change the ground rules of science to include the supernatural" (Kitzmiller 2005:30).

6. Steiner actually constructed an entire historical fantasy of early humanity, including the so-called Atlantean and Lemurian races, and an account of the division into the sexes. (According to Steiner, humanity began as a sexless species.) Material from this history was supposedly secret and channeled "on the basis of direct spiritual perception" which he considered more reliable than "historical documentation" or "external evidence" (Steiner 1959). See, e.g., http://wn.rsarchive.org/Books/GA011/CM/GA011_c02.html.

7. There is also a side issue as to whether it is possible for a conventional farm to use artificial treatments judiciously enough that it could be indistinguishable from organic on all the same measures.

8. Carpenter-Boggs also wrote: "These data support earlier findings that organic fertilization rapidly benefits microbial biomass and activity, but provide few indications that the biodynamic compost and field sprays [that is, the 'preparations'] further affect soil microbial mass, community structure, or activity in the long term."

9. Their group actually went to some trouble to find variables in which the biodynamic grapes came out ahead. For example, they claimed to find evidence that the nonbiodynamic grapes were "overcropped" (producing too much fruit). Their choice of citation for this data is a highly questionable and nonpeer-reviewed Web page; other peer-reviewed documents fail to support their contention that a yield to pruning weight of 5:1 to 6:1 is appropriate. (See, e.g., Moulton et al. 2005, p. 11.) At any rate, they do in the final analysis conclude that "The differences observed were small and of doubtful practical significance" (Reeve et al., 2005:374).

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Masaru Emoto's Wonderful World of Water

It can read, listen to music, look at pictures, hear your thoughts, heal you, and create world peace.

HARRIET HALL

The folks in my community have been arguing about fluoride again. A nutritionist wrote in the local newspaper that fluoride is a deadly poison and that it doesn't reduce tooth decay. She recommended avoiding it entirely, even to the extent of buying nonfluoride toothpaste. I responded with a calmly reasoned guest column trying to separate the scientific facts from policies and opinions. The scientific facts are not open to debate: fluoride in optimum amounts reduces tooth decay; too much fluoride can be harmful. The public policy question is open to opinion and debate: should we add fluoride to the water or protect our children from tooth decay by other means?

I know that at least one person read my guest column, because there was a letter to the editor in the following issue of the paper. It was written by a very confused woman who signed herself "Reverend." She disregarded my arguments about the effectiveness of fluoride and the advisability of separating facts from opinions, and she fixated on one thing: her opinion that adding anything to our water is wrong. She's certainly welcome to her opinion, but she based that opinion on pseudoscientific nonsense that she confused with scientific truth. She wrote:

> I am saddened that Harriet Hall is not aware of the latest scientific research by Dr. Masaru Emoto. In his two books, *The True Power of Water* and *The Hidden Power of Water* he describes the healing capabilities of non-toxic water (chemical free). Our country is too toxic from pollution, food, thoughts and water we drink. . . . I suggest people go to Dr. Emoto's lecture . . . and see the slides of microscope samples of the toxic, repulsive water crystals compared to those of pure untainted water. Or, see the movie *What the Bleep Do We Know* now on DVD, which shows slides of the difference in their molecular structure. Which would you want to drink?

I wrote back that she was wrong that I wasn't aware of Dr. Emoto's "research."

> His newest book, *Hidden Messages in Water* holds a place of honor on my bookshelves as the worst book I have ever read. It is about as scientific as *Alice in Wonderland*. Emoto took pictures of snowflakes and "observed" that clean water made prettier crystals.
>
> A [real] scientist would have checked to see if he got the same results if he didn't know beforehand which water was clean. Emoto never bothered with even this most elementary double-check. He didn't consult real scientists. Had he done so, they could have told him that these snowflake crystals, just like raindrops, form around a core of dust, so actually the cleaner water is less likely to form them. Their beauty varies with the temperature and conditions of formation, not with the purity of the water. The idea that snowflakes could show anything about differences in the "molecular structure" of water is incompatible with basic physics.
>
> Emoto's popularity is a sad commentary on the scientific illiteracy of our society. His work is a morass of factual errors, misconceptions, misinterpretations, metaphors, and meaningless assertions. He writes in the language of magical thinking and superstition, not of science.
>
> Most serious scientists find Emoto's delusions too silly to even acknowledge, but one retired chemistry professor has taken the time to debunk water cluster pseudoscience and Emoto's "research" on his Web site: www.chem1.com/CQ/clusqk.html.

I didn't mention that I saw the *What the Bleep* movie and didn't find it particularly convincing as a scientific document. Its credits list the 35,000-year-old warrior Ramtha "as channeled by J.Z. Knight."

Remember talking to plants? Emoto talks to water. He claims that if you say nice things, the water makes pretty crystals, and if you say mean things, it just makes amorphous globs. You don't even have to talk out loud, because water can read. Humans have to be taught to read, but water is smarter—it already knows how. If you place labels with "Thank you" or "You idiot!" on containers of water, the water will respond by making pretty or ugly snowflakes.

Water can not only read, it can look at pictures: a picture of a tree resulted in "a large crystal that seems to be teeming with life," while a picture of autumn leaves created a "crystal that appears to be formed by leaves before they have fallen from the trees." The one I liked best was a crystal from water exposed to the word "war" two months before September 11, 2001. He says it looks "almost as if a jet plane crashed into it."

Emoto talks to plants too. The *What the Bleep* movie describes an experiment where cooked rice rotted faster if labeled with negative words. Most experiments are published somewhere. I looked for this one in vain. I finally realized that he was only reporting what children had done informally in a private home and reported to him by mail. He "verified" the findings by suggesting to other devotees that they try the same experiment, and some of them reported that it worked for them, too.

A real scientist would ask questions such as: How many people tried the experiment, failed, and *didn't* report to him? Were the rice samples kept under exactly the same conditions? Did the experimenters treat the samples with "good" words any differently, for instance by picking them up more often to check them, or breathing on them? Did anyone try it with double blinding so the observers wouldn't be aware of which samples had which labels? Was an endpoint predetermined, or did the observers just subjectively decide which rotted faster? Was any statistical analysis done to rule out "noise" and the effects of chance? Emoto doesn't ask such questions; he just marvels about the reports.

Harriet Hall, also known as the SkepDoc, is a retired physician who lives in Puyallup, Washington, and writes about alternative medicine and pseudoscience. This is her sixth article for the SKEPTICAL INQUIRER. *Her e-mail is harriet.hall@comcast.net.*

In another example, he unquestioningly accepted the results of an experiment with a sample size of only two. A girl grew two sunflower plants, one labeled "fool," whose growth was stunted, and one not labeled. Emoto would like us to believe that obviously the stunted plant was reading the label, because otherwise there's no conceivable reason why one plant might grow better than another.

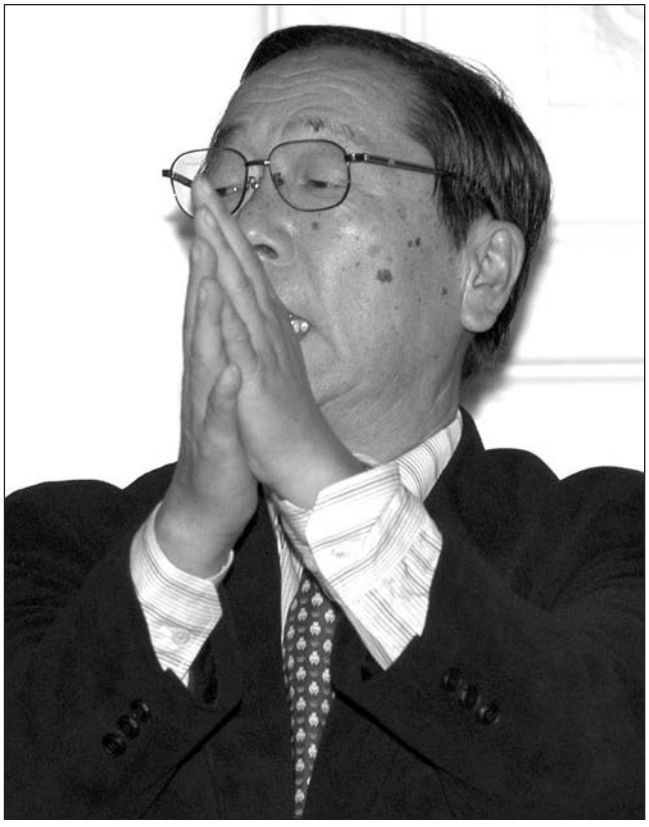
Water likes to listen to music, too: when one sample listened to "a mournful melody," it supposedly formed different crystals than water exposed to a song by the musician Enya. The Enya water produced a crystal that was "pure, innocent, and white, just like her voice." *All* snowflakes are white, and voices aren't white—unless you suffer from synesthesia. And how could you possibly determine the "innocence" of a crystal? He sees things in crystals like "a brilliant healing effect" and "overflowing love." He has a great imagination, but an independent observer would have a hard time matching the photos to his descriptions.

He has what he calls a "hado" machine. According to Emoto, everything emits hado. He tests patients with his hado machine, and if they are too ill to leave their bed, he prints out the person's name and tests the printed slip or their photograph. Then he infuses water with hado to counteract their illness. He brilliantly rehashes the unfounded claims of "energy medicine" and employs a new version of the quack electrodiagnostic machines that have been fooling patients for decades.

He explains how everything in the universe vibrates, and his machine detects those vibrations. He knows a doctor who collected blood samples from patients, kept them for years, and was able to diagnose the patients' current illnesses because the vibrations in the old blood samples changed as the condition of their bodies changed. He knows of people who can sense from the vibrations of a photograph whether the person is alive or dead. He fails to explain, however, why these talented people have not applied for (and won) James Randi's million dollar challenge.

Apparently Emoto has been challenged for not being scientific, so in one of his latest books, *The Secret Life of Water*, he admits, "Photographing crystals is a subjective science." Did you know there was such a thing as a subjective science? He says, "The methods employed to photograph water crystals might not pass everyone's definition of being scientific, and there is a degree of uncertainty involved. In fact, there is much about the world of hado that is murky and that cannot be explained by the black-and-white standards of statistical analysis. But when you think about it, all any scientist can do anyway is lift up one small corner of the veil that covers the truth of this world and then try to express it with words that the general population can stretch their minds around." He compares the uncertainty of subjectively choosing when to snap the pictures of snowflakes to that of Heisenberg's uncertainty principle in quantum mechanics. He thinks that "water changes its form completely depending on the person doing the observing" and whether the observer's heart is filled with appreciation or anger.

He classifies the crystals into eight ill-defined categories that he apparently made up. In his analysis of crystals from water from the Honmyo River, he found this distribution:



Masaru Emoto. (Notimex/foto/Guillermo Granados/GGV/POL/) [Photo via Newscom]

Beautiful: 2
Rather beautiful: 4
Hexagonal pattern: 0
Radial pattern: 8
Lattice pattern: 8
Indefinite pattern: 29
Collapsed pattern: 3
No crystal formation: 0

In this case, he chose a beautiful crystal to represent the sample, because although there were only two beautiful crystals out of fifty, there were others that were in the process or had the potential to make beautiful crystals. Eminently rational, don't you think? By this kind of reasoning, if an antibiotic only cured two cases of pneumonia out of fifty, we could give it credit for being in the process or having the *potential* to cure other cases. The drug companies would love that.

He says tap water with chlorine doesn't usually form crystals, but when Emoto had five hundred people pray for a jar of tap water on his desk, he claims it formed beautiful crystals. He would have us believe that prayer and feelings of love work instantaneously at any distance, that water has ESP and can tell which feelings are directed to it, and that prayer changes the appearance of the crystals. Of course, he admits that the crystals are constantly changing anyway, and he has to arbitrarily choose a point to photograph them. With his

Continued on page 69

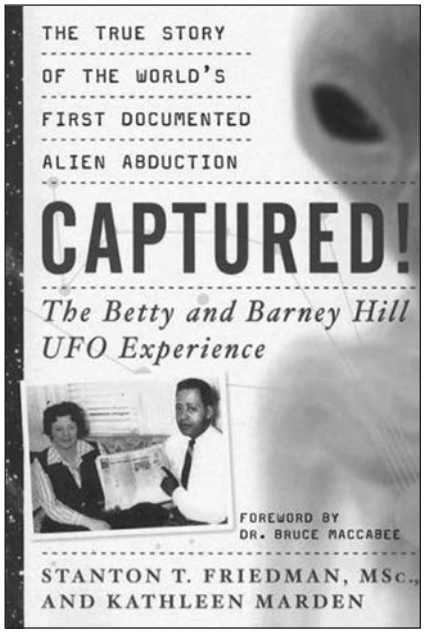
Over the Hill on UFO Abductions

ROBERT SHEAFFER

Captured! The Betty and Barney Hill UFO Experience. By Stanton T. Friedman and Kathleen Marden. Franklin Lakes, New Jersey: New Page Books, 2007. ISBN-13: 978-1564149718. 319 pp. Softcover, $16.99.

The story of the alleged UFO abduction of Betty and Barney Hill in New Hampshire in 1961 is well known to the public. It was an alleged close encounter followed by amnesia, "missing time," and frightening dreams. Later, the "missing memories" were recovered by a psychiatrist using hypnosis. Under hypnosis, both Hills told a harrowing tale of abduction and medical examination on board an extraterrestrial craft.

Captured! is the second major book published about the Hill case this year, which itself is rather surprising. The first volume was *Encounters at Indian Head*, the proceedings of a once-secret symposium held in 2000, in which I participated (see my report, SI, September/October 2007). Kathy Marden is Betty Hill's niece and now the executor of her estate. What is more surprising is that Stanton Friedman, known throughout the UFO community for his querulous bombast and immense ego is, despite being given top billing on the cover, in fact the junior author. The book's Library of Congress entry lists Marden as the primary author. Friedman writes in the preface, "I was especially pleased that Kathy Marden invited me to help out some on this book." That is no doubt



the reason the book is of relatively temperate tone (except for the chapter on skeptics, which carries Friedman's fingerprints). Marden at least attempts to deal with the arguments of skeptics and other critics, even if many of the answers she gives do not convince. She admits to the existence of certain inconsistencies and difficulties in the story, issues that never seem to have troubled Friedman.

The book's primary strength is the wealth of new details about Betty and Barney Hill from several sources: Betty's previously unpublished diary and correspondence, additional quotes from the tapes of the Hills under hypnosis by Dr. Benjamin Simon, plus interviews giving her friends' and family's memories of what transpired, including Kathy's own. Because of this, we see a much richer picture of the Hills than previously available. Our knowledge of Barney especially is fleshed out. We learn that prior to undergoing hypnosis, while Barney was recounting his alleged alien encounter, his face "kept twitching spasmodically to one side." The picture of Barney that emerges is that of a man under enormous pressure: "The long daily commute to his job in Boston, the necessity of sleeping during daylight hours, his physical separation from his sons," not to mention the social stigma of a black man in an almost all-white state married to a white woman. All of this took a toll on his health. Is this information relevant to an analysis of Barney's claimed extraterrestrial experiences? Absolutely, but what exactly does it enable us to conclude? If only the laws governing human behavior were as predictable as those of chemistry or physics!

One major problem in telling the story of the Hills' adventure is that Marden freely mingles the Hills' original account with details later supposedly "recovered" by hypnosis. This makes the case sound far stronger than it actually was. For a more careful recounting of the Hill story in its proper sequence, see Dennis Stacy's paper in the *Encounters* volume.

One surprise disclosed in the book is "The Dress Analysis." In a chapter that brings to mind the Bill Clinton investigations, Marden reveals that Betty, upon

Robert Sheaffer, an SI columnist and contributing editor and longtime observer of the UFO scene, is author of UFO Sightings: The Evidence *(Prometheus 1998).*

returning home after her alleged abduction experience, hung up the dress she had been wearing in a closet and left it there, undisturbed, for many years. The lining and zipper are torn, supposedly confirming her account of the aliens forcibly removing it from her, although a number of earthly explanations also come to mind. After a hypnosis session in 1964, she retrieved the dress from the closet and found it covered with a pink, powdery substance. The substance blew away, but "the dress was badly stained." Samples from the dress were sent to various labs for testing. Several tests unsuccessfully attempted were made to try to replicate the stain using various chemicals, which is supposed to convince us that the discoloration is extraterrestrial in origin, although acid produced a similar stain of a different color. Also detected were "substances with detergent-type properties (not soap)." The most interesting analyses were conducted by the Pinelandia Biophysics Laboratory of Michigan, which specializes in the analysis of crop circles. They found that the stained portions of Betty's dress would "induce a higher degree of energy in the water" than the unstained ones. No mention is made of just what kind of "energy" is being talked about. Marden concludes that the results "seem to point to the presence of an anomalous biological substance that has permanently altered the substance of Betty's dress." I would expect that an item of clothing left undisturbed in a closet for forty years would pick up all manner of interesting biological substances from insects, spiders, mites, mold, bacteria, etc.

Once again, the "star map" Betty Hill allegedly saw on board the UFO is trotted out as "proof" of the story. Selecting sun-like stars from the latest catalog of nearby stars, Marjorie Fish spent many long hours looking for a pattern that matches the sketch Betty Hill drew by posthypnotic suggestion, supposedly replicating a map she had seen aboard the saucer. After much effort, she believed she had found one. The controversy over the star map is so complex that it is impossible to cover in detail here. The detailed counter-argument is in my paper in the *Encounters* volume, arguments routinely ignored by Friedman, Marden, and all other pro-star-map writers. In brief, it is necessary to "fudge" the data to make the Fish map come out the way it does. One "favorable" star needs to be excluded, and two "almost favorable" stars selectively included, for Fish's purpose. My conclusion was, "The apparent validity of the Fish map is due to selective inclusion of data and by misdrawing the map to make it appear to match Betty Hill's sketch." Perhaps the simplest and most telling argument against the Fish map was made by astronomers Steven Soter and Carl Sagan back in 1975, who pointed out that the apparent resemblance between the two patterns exists almost entirely because of the way the lines are drawn connecting the dots. View the two patterns as unconnected dots, and they appear as different as two patterns can be.

Another problem for the star map believers, for the most part ignored, is that the supposed "match" of Marjorie Fish is not unique. To date, there have been at least four other supposed identifications of the pattern. One is by Betty Hill herself, depicting the constellation Pegasus. A second is by Charles Atterberg depicting nearby stars, but different ones than Fish uses. A third is by two German UFOlogists, who attempt to match it up with our solar system's major and minor planets. A fourth is by Yari Danjo, who finds the aliens' home star system to be Alpha Centauri. Marden dismisses Betty's Pegasus map as "only a coincidence" and dismisses Atterberg's work as lacking "the solid basis found by Fish." Actually, Atterberg's pattern is much closer to Betty's sketch than the Fish pattern, and accounts for a greater number of stars. The lesson of the star map? Given an almost unlimited number of degrees of freedom in selecting what you will include in your search, what scale you will use, and what vantage point you will take, it is to be expected that quite a number of apparent matches to Betty's pattern can be found if one is willing to expend enough effort to do so.

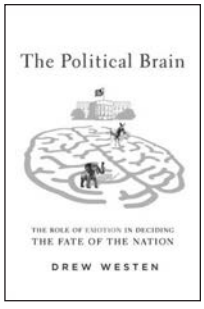
The most contentious chapter of the book is titled "Disbelievers and Disinformants." UFOlogists are convinced that anyone questioning their claims is likely paid to spread disinformation. We are told that the late astronomer and skeptic Donald H. Menzel of Harvard was "probably a member of the Majestic 12 Group controlling classified UFO research" (a supposed group whose existence is "revealed" in some documents of unknown origin that are almost certainly hoaxes). We are informed that "the Hill case in general, and the star map work in particular, have been attacked, sometimes viciously and almost always irrationally, by the small group of nasty, noisy, negativists making up the UFO debunker community." This sort of rhetoric is commonplace within the UFO community (in addition to being Betty Hill's niece, Marden is a longtime MUFON official)—those promoting that the claims of extraterrestrial contact and abduction are "scientific" while those trying to refute them are "irrational." She accuses skeptics of resisting the UFO evidence for the same reason that the Church resisted Copernicus: it would upset their rigid, preconceived worldview. Objections based on the impossibility of faster-than-light travel are refuted by pointing out that if you are traveling at 99.99 percent of the speed of light, you could reach Zeta Reticuli in just six months of elapsed time on a craft. No mention is made of the enormous amount of fuel needed to accelerate to, and decelerate from, these speeds (or of the fact that you must also accelerate to 99.99 percent of the speed of light all the fuel needed for deceleration, unless you want a one-way ticket out of the galaxy!).

Barney Hill did not live long enough to become a widely known personality in the UFO subculture. He died suddenly of a stroke in 1969 at the age of only forty-six. Thus, it is difficult to make an

independent assessment of his credibility. Betty Hill, however, lived to a ripe old age and became one of the best-known figures in the UFO community, a constant fixture on TV shows, at UFO conferences, etc. Whatever credibility she may have once had soon perished by her own hand. I was present at the National UFO Conference in New York City in 1980, at which Betty presented some of the UFO photos she had taken. She showed what must have been well over two hundred slides, mostly of blips, blurs, and blobs against a dark background. These were supposed to be UFOs coming in close, chasing her car, landing, etc. Marden includes several of these photos in the book. After her talk had exceeded about twice its allotted time, Betty was literally jeered off the stage by what had been at first a very sympathetic audience. This incident, witnessed by many of UFOlogy's leaders and top activists, removed any lingering doubts about Betty's credibility—she had none. In the oft-repeated words of one UFOlogist who accompanied Betty on a UFO vigil in 1977, she was "unable to distinguish between a landed UFO and a streetlight." In 1995, Betty Hill wrote a self-published book, *A Common Sense Approach to UFOs.* It is filled with obviously delusional stories, such as seeing entire squadrons of UFOs in flight and a truck levitating above the freeway.

Marden attempts to deal with the credibility problem in her final chapter, "Betty Hill's Fall From Grace." She explains, "After Barney's death, [Betty] turned away from careful, objective evaluation, and with subjective enthusiasm began to identify any lights in the sky as UFOs." However, the newly published material in *Captured!* suffices to refute this excuse. Betty Hill wrote in a letter dated April 4, 1966: "Barney and I go out frequently at night for one reason or another. Since last October, we have seen our 'friends' on the average of eight or nine times out of every ten trips, outside of Portsmouth. . . . Last Saturday Barney and I decided to retrace our trip in the White Mountains, as of September 1961, but this time my parents were with us. As we were returning through the Franconia Notch in the general area of the tramway and Cannon Mountain, one [UFO] moved around the mountain about fifty feet from the ground, in front of us. Its lights dimmed out and we could see the row of windows before it became invisible." This latter sighting, which would have been April 2, 1966, sounds very much like the reported pre-abduction close encounter of 1961: a UFO with lights and a row of windows flying at low altitude in front of their car and going behind the White Mountains. The believers in the Hills' account must somehow argue that Betty and Barney's reported multiple UFO encounters in 1965 and 1966 are delusional and should be quietly dismissed, while the first one in 1961 must be taken with deadly seriousness. Occam's razor would have us conclude that all of Betty Hill's reported UFO encounters, with or without Barney present, are equally delusional.

One factor to keep in mind is that we know today far better than we did in the 1960s, that supposed "repressed memories" recovered via hypnosis are extremely unreliable. In the absence of any real physical evidence, the case for believing the Hill abduction story ultimately rests on the credibility of the witnesses, and on the credibility of the hypnosis-recovered memories. Neither inspires confidence.



Governed By Emotion

PETER LAMAL

The Political Brain: The Role of Emotion in Deciding the Fate of the Nation. By Drew Westen. Public Affairs, New York, 2007. ISBN 13: 978-1-58648-425-5. 424 pages. Softcover, $26.95.

For those of us who have long believed that our voting and our political attitudes are primarily emotionally driven, Drew Westen, a professor of psychology and psychiatry and lead investigator of a team of neuroscientists, provides strong support in *The Political Brain: The Role of Emotion in Deciding the Fate of the Nation.* His central thesis is that the predominant view of the mind since the eighteenth century, that it is dispassionate and "makes decisions by weighing the evidence and reasoning to the most valid conclusions" (p. ix), is false. When facing political questions, issues, and candidates, our emotions rule. Furthermore, these emotional processes are the result of neurological processes of which we are unaware; they are inaccessible to consciousness.

Part 1 is devoted to a brief description of the relevant structures and functions of the brain when engaged with political matters. Part 2 describes ways in which our emotional brains determine how we respond when dealing with particular political issues.

Throughout, Westen provides examples of campaign practices that have been effective or ineffective because they were or were not congruent with our emotion-driven political behavior. For the last three decades, with the exception of the Clinton era, Democratic presidential candidates have been unsuccessful because they and their strategists have believed in a view of the mind as being dispassionate and, therefore, that

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campaigns should focus on presenting voters with "facts, figures, policy statements, costs and benefits, and appeals to intellect and expertise" (p. 15). A comparison between an effective 1992 Clinton television ad versus a 2004 Kerry ad is used to illustrate this.

Current models of decision making, based on rational-decision theories that focus on individuals weighing costs and benefits of options they face as they attempt to maximize their expected utility, are not relevant to voters' behavior. But much of contemporary Democratic campaign strategy is based on rational-decision theory. Republican strategists, in contrast, have been very successful in triggering voters' emotions that cause them to vote for Republicans.

Our "emotional agendas" (p. 96) determine what evidence we find persuasive, the data we readily accept or reject, and the sources of information we find credible, including newspapers, magazines, and television programs. Importantly, members of government at all levels, not just the general public, also have emotional agendas.

Westen maintains, for example, that the decision by the U.S. Supreme Court's conservative majority in the disputed Bush/Gore 2000 presidential election indicated that those justices lacked awareness of the self-deception and rationalization that is true of all of us. We are not totally unable to be swayed by cognitive factors. But, when we make judgments about emotionally significant political matters, the effects of cognitive factors are trivial. Our emotional reactions far outweigh them. Thus, these reactions often cause voters to vote against their self-interests.

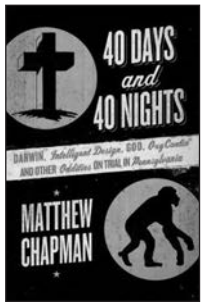
The overriding importance of emotions in determining voting patterns means, says Westen, that managing the electorate's positive and negative feelings should be the primary goal of political campaigns. He describes four principles for successfully managing voters' emotions. For example, messages should be "framed" so that they elicit the right connotations and prevent acceptance of the other party's framing of an issue. Research suggests that success in eliciting positive emotions among voters is the best predictor of a campaign's success. "The data from political science are crystal clear: people vote for the candidate who elicits the right feelings, not the candidate who presents the best arguments" (p. 125).

Other topics include discussion of five myths about negative campaigns, how to respond to campaigns designed to arouse hate and fear, and addressing matters of values, morality, and faith.

Some readers might discount what Westen has to say because he makes it clear that he is a strongly committed Democrat. But one's political allegiance has no necessary connection with one's scientific endeavors, and Westen's description of aspects of cognitive psychology and neuroscience indicate no coloring of his consideration of those matters by his political convictions. Westen provides examples of campaign messages that he believes would be effective in stimulating positive and negative emotions and also those that would be effective in countering political attacks. The types of messages would be effective if used by either Democrats or Republicans. Indeed, this book could serve as a handbook for those of any political persuasion who want to influence the electorate.

On the negative side, Westen frequently uses the term *mind*, a term carrying dualistic conceptual baggage. When will scientists have the courage to discontinue using the term and explain why they dropped it?

But there is a more fundamental issue concerning cognitive psychology and neuroscience. William R. Uttal has raised serious questions about the assumptions underlying these disciplines, their conceptual foundations, their methods, and whether psychology is, or can be, a science (e.g., *Psychomythics*, 2003; *The Immeasurable Mind*, 2007). Reading both Westen and Uttal may very well elicit an emotional response.



Kitzmiller v. *Homo boobiens*

GREG MARTINEZ

40 Days and 40 Nights: Darwin, Intelligent Design, God, OxyContin, and Other Oddities on Trial in Pennsylvania. By Matthew Chapman. HarperCollins, New York, 2007. ISBN 978-0-06-117945-7. 272 pp. Hardcover, $25.95.

In many cases, the writings of H.L. Mencken are less examples of journalism than they are master classes in the art of crafting an insult. Mencken was one of the great scourges of American Christian fundamentalists, calling them "*Homo boobiens*," and wrote bluntly that a person was a "fundamentalist for the precise reason he is uneducable [*sic*]. . . . [And] no amount of proof of the falsity of their beliefs will have the slightest influence on them." One of the centerpieces of H.L. Mencken's considerable body of work is his series of dispatches from the Scopes "Monkey Trial" as published in the *Baltimore Evening Sun* in 1925. They are perfect examples of his slashing rhetoric and merciless assaults on ignorance and cant, and are still wickedly fun to read more than eighty years after their original publication.

Such flinty insights make one yearn for a present-day Mencken to have been at the trial of *Kitzmiller v. Dover Board of Education*, a twenty-first century

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Monkey Trial, to launch a fusillade at the intellectual dishonesty that ran rampant in Judge John Jones's courtroom. Matthew Chapman, the great-great-grandson of Charles Darwin, is no Mencken, but his account of the trial in *40 Days and 40 Nights: Darwin, Intelligent Design, God, OxyContin, and Other Oddities on Trial in Pennsylvania* is an entertaining and thoughtful look at a notable battle in America's seemingly endless culture wars.

The book begins with a loose and often rambling journey through the events that led to the trial in late 2005. A decision by the Dover, Pennsylvania, Board of Education to purchase the creationist/intelligent design book *Of Pandas and People* to replace its aging biology textbook for use in ninth-grade science classes was met with strong resistance by two of its members and a group of eleven parents who united to sue with the assistance of the American Civil Liberties Union. As the case progressed, more interested parties became attached to the case, and it grew to become, like the Scopes trial, a flashpoint for argument, a *cause célèbre*, a media event across the globe, and yet another referendum on the separation of church and state.

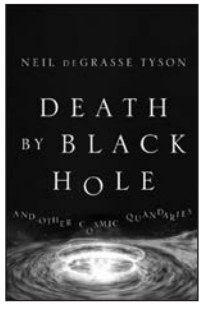
The three rings of this circus were filled with dozens of colorful performers, all of whom are profiled with an eye for telling detail (although that detail is too often a label as "eccentric") and a large dose of compassion. Indeed, Chapman often comments about how likable the people he encounters are, even though one would think he would dislike them. Leading this category is former board member Bill Buckingham, a retired police and corrections officer who is the most pugnacious and belligerent of the bunch. He defiantly shouted during one of the board discussions over the textbook controversy, "Two thousand years ago, someone died on a cross. Can't someone take a stand for him?" That his curriculum decisions and comments were made while addicted to OxyContin is not glossed over by Chapman. But when he interviews Buckingham during the trial, almost two years after his outrageous behavior that precipitated the conflict, he finds a broken-down man who has experienced the deaths of many family members, had two stints in detox, and contemplated suicide.

Chapman does not have trouble finding compassion for Buckingham but cannot find it in himself to have it for the other board members, and in a chapter titled "Bonsell and His Trinity of Loyal Women," he gets in touch with his inner Mencken. He finds a particular distaste for one of the female board members whom he describes as a "woman who seemed to think—against all evidence—that everything she did and said was astoundingly adorable and funny" and who "fell squarely into the repellent category without mitigation." Even the normally evenhanded Judge Jones became exasperated with her inability to answer questions clearly and stopped her from leaving the witness stand after questioning by attorneys in an attempt to clarify her opaque answers.

As the book progresses to the trial stage, its focus sharpens considerably, as does Chapman's observations of the proceedings. His detailing of the slow and steady demolition of Michael Behe's credibility as a scientist at the hands of the plaintiff's lawyers, including the uncovering of documentation that indicates that his "landmark" theory of irreducible complexity was plagiarized from an article in the June 1994 issue of the *Creation Research Society Quarterly* written by Dr. Dick Bliss, is to be savored.

In some ways, Chapman is the polar opposite of Mencken: he is empathetic where Mencken is condemning, inquisitive where Mencken is barbed. His sensitivity, however, does not mean that the considerable dishonesty of the defendants and the damage done by their actions are slighted. The concluding chapter of the book effectively braids together the many threads of observation made by Chapman about the grave dangers of fundamentalism and irrationality.

While not as scholarly as Edward Humes's recent *Monkey Girl: Evolution, Education, Religion, and the Battle for America's Soul*, Chapman's book focuses on the human story behind the trial and succeeds at illuminating the emotional and ideological underpinnings of this legal and political event. Reading these two books along with Judge Jones's masterfully written decision in the case provides a wide-ranging and thorough view of this generation's own Scopes trial.



Cosmos and Commentary

KENNETH W. KRAUSE

Death by Black Hole and Other Cosmic Quandaries. By Neil deGrasse Tyson. W.W. Norton, New York, 2007. ISBN: 978-0-393-06224-3. 384 pp. Cloth, $24.95.

Wonderful treasures sometimes arrive in small packages. Such an observation—though certainly true—would normally seem inappropriate as a prelude to a new book about something as unimaginably huge as the cosmos. That is, unless the book consisted of the brief and superbly engaging essays of Neil deGrasse Tyson, sometimes commended as the planet's most charismatic and telegenic astrophysicist. Tyson has packaged the universe into forty-two modest yet appreciable gifts, a veritable high-end display case of science history and cutting-edge cosmology accented with occasionally

reluctant but often witty social commentary. In *Death by Black Hole*, Tyson explores everything from Goldilocks to God, highlighting the origin of stars and the life that, now and again, arises from their violent demise.

Hundreds of light-years deep, an interstellar gas cloud circles an ordinary galaxy's heart, patiently awaiting its opportunity to collapse and conceive a star. Ironically, the cloud must first cool to less than one hundred degrees above absolute zero in order to craft a star with the ten-million-degree core required for thermonuclear fusion. Only then can otherwise unruly atoms collide and adhere to fashion large, carbon-based molecules that, at some point, might seed the universe with the building blocks of planets, people, and perhaps much more.

That supernovas are primarily responsible for the universe's varied collection and relative mix of heavy elements is the most under-appreciated discovery of the twentieth century, writes Tyson. Rare, high-mass stars, through traditional thermonuclear fusion and neutron capture, manufacture not only the elements common to life as we know it—hydrogen, nitrogen, oxygen, and carbon—but much weightier things as well. Fusion demands higher and higher temperatures as the elements grow heavier. Energy is released at nearly every stage, until the star is ready to make iron. Calamity ensues, at least for the star and everything near it. Energy is absorbed, the stellar mass collapses, and temperatures soar so rapidly that the star blows itself to bits and beams a billion times brighter than ever.

The cosmos as a whole, however, reaps magnificent rewards—as Earth did when it materialized 4.6 billion years ago. After condensing out of a proto-solar gas cloud, a very young and unsightly planet continued to accrete particles until it grew big enough to absorb impacts from mineral-studded asteroids and water-laden comets. These early beatings may have been frequent enough to create the oceans as we currently know them. Volcanic out-gassing and the house-sized hunks of ice that continue to bombard Earth's upper atmosphere help too. In any case, at ninety-three million miles from the Sun, our planet appears to have located a very special home for itself.

Or has it? The space between Venus and Mars is often referred to as the "Goldilocks habitable zone," and many extrapolate from their solar-centric experience to conclude that only planets within similar distances from their stars can nurture life. But hold on. First, the Sun was a third less luminous back when Earthly life began to develop. Second, not all stars are created equal. A small, cool, low-luminosity star will tidally lock any planet within its comfort zone—which of course will be much nearer to a smaller star—much as Earth tidally locks the Moon. Thus, all planetary water would either evaporate or freeze, depending on its hemisphere. Conversely, although they provide relatively sprawling sweet spots for life, large, hot stars are rare and short-lived. The evolution of complex life, on the other hand, takes a very long time.

Recent and exciting discoveries, however, inform us that our old, stellar-distance based definitions of "habitable zone" are just plain worn out. According to Tyson, in fact, Earth's first life forms probably never experienced the light of day. "Extremophiles," as they are now called, thrive on various sources of energy, including the geothermal belches that escape from ridges along the ocean floor. We now know as well that overwhelming gravitational forces heat icy Europa from within. Jupiter, its giant, gaseous host, creates the energy tidally—simply by tugging much harder on Europa's proximate side than on its distal side. Indeed, substantial evidence suggests a sea of slushy water sloshing about only one kilometer beneath the satellite's surface.

All this is not to imply that water is necessary for the creation of life. If only some sort of liquid is essential, as many believe it is, perhaps ammonia or ethanol—both plentiful in the universe, and both much more accommodating than water in ultra-frigid environments—will do. Although frozen water has been discovered on Titan, Saturn's largest moon, temperature and air pressure have liquefied the satellite's more considerable supply of methane. In 2005, Europe's *Huygens* probe relayed images that seem to depict rivers and lakes full of the stuff. No wonder some astrobiologists now tout Titan as a ripe experimental window into Earth's ancient past. Given such potential, then, one might readily infer that the cosmos is teaming with life. After all, 90 percent of the universe's constituents are the hydrogen atoms from which all others are eventually created.

But *intelligent* life is another matter. Some estimate that, over the millennia, ten billion different species have evolved on Earth. In isolation, of course, that reality offers creatures like us a paltry one in ten billion chance of existence. Consider also that about half of all "stars" are actually binary or multiple systems driving chaotic or elongated planetary orbits and, thus, extreme terrestrial temperature swings. Faced with a thousand reasons to believe and a thousand reasons to disbelieve in deep space intelligence, maybe all we can do is keep listening and transmitting.

Humans have been sending radio waves into space at the speed of light for nearly one hundred years now. Although our goal has seldom been interstellar communication, radio is especially appropriate to that task because electromagnetic waves generally require no travel media, and because radio waves specifically penetrate very efficiently through gas and dust clouds. To date, our "radio bubble," as Tyson calls it, encompasses every star around which a planet has thus far been found, including

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Alpha Centauri, at 4.3 light-years away; Sirius, our sky's brightest star at ten light-years out; and about a thousand others. So, if aliens are listening, they might have an opportunity to partake in any message sent at frequencies greater than twenty megahertz, including FM radio and television. Unfortunately for them, other signals are seized by our ionosphere and reflected back to the surface.

But there are more serious complications. Despite their relative efficiency, radio waves weaken even as they race through the vacuum of space. Cosmic rays, the microwave background, star formation, and radio-emitting galaxies are among the many forces that will ultimately obscure the most purposeful and well-intended tiding. In order to gather a television station's carrier signal only, an extraterrestrial would have to construct a receiver with a collecting area fifteen times larger than that of the three-thousand-foot Arecibo telescope in Puerto Rico, our planet's largest. And, if the yearning stargazer actually wanted to decode our message's content, it would have to first adjust for Doppler shifts caused by Earth's rotation and revolution, and then build a dish about twenty miles wide, or four hundred times Arecibo. That's a lot of work—and for what? A weekly dose of *Desperate Housewives* and reruns of *Welcome Back, Kotter*.

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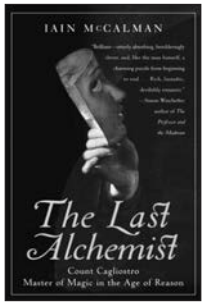

The Greatest Occultist in Western History?

RICHARD PETRAITIS

The Last Alchemist: Count Cagliostro, Master of Magic in the Age of Reason. By Iain McCalman. Perennial/Harper Collins Publishers, New York, 2004. ISBN: 0-06-000691-9. 272 pp. Softcover, $13.95.

In *The Last Alchemist*, Iain McCalman has written a fascinating historical biography of Joseph Balsamo, a man reputed to have been Europe's greatest alchemist and necromancer—the "Count Cagliostro." Born in 1743, Balsamo was a young street tough and local sorcerer hailing from the dangerous streets of Palermo, Sicily. During a stint at a local monastery, Balsamo learned ritualistic magic cons from a renegade priest which allowed him to embark upon a career parting the credulous from their gold. At the age of twenty during a treasure hunt, he foolishly incurred the wrath of a prominent citizen of Palermo by promising spiritual protection against demons for a sizable monetary sum. For his trust in the young wizard, the townsman was rewarded with some paltry special effects and a beating. After this incident, the young Balsamo quickly and wisely left the island of Sicily with several traveling companions. The party made landfall in North Africa, from where the future Count soon began his many adventures.

Joseph Balsamo crisscrossed Europe for three decades seeking wealth and celebrity as a worker of the magical arts. During his long career, "Count Cagliostro" was able to woo thousands into believing he had magical healing abilities—in an age when Europe embraced reason. Of special note, Balsamo was garnering his audiences at a time when other contemporary con men—such as hypnotist Franz Anton Mesmer, the allegedly immortal Count of St. Germain, and Gian Casanova—were at their career peak.

McCalman notes that the charismatic Balsamo was able to achieve notable prominence in Europe's royal courts by forging his way to stardom as a military man and royal prince, the "Count Cagliostro." Even the great Casanova was impressed by Balsamo's talents in forgery. Seeking ever greater fame, Count Cagliostro astounded the continent's Masons (men who viewed themselves as promoters of reason and revolutionary ideals) with his purported knowledge of alchemy and Eastern mysticism.

Cagliostro was able to live comfortably for many years with his young wife Seraphina off of the generosity of "purse-heavy" believers in his brand of mystical alchemy—an impressive feat given that the alchemists' theory of transmutation had already been destroyed by Robert Boyle with his use of the scientific method in chemical investigations.

Alchemy wasn't the Count's only game. Balsamo often awed believers in spiritism with séances, in which he employed specially coached young children. He invoked "archangels" and "jinn" at these staged events. Not surprisingly, Cagliostro's archangels were enlisted to locate treasures for very affluent clients.

As recounted by McCalman, Count Cagliostro traveled to Eastern Europe and attempted to import a brand of mystical Freemasonry into the court of Catherine the Great. Initiated as a Freemason in London, England, under the lodge rules of the Strict Observance Rite in 1777, he placed himself at odds with more conservative Grand Orient Masons who hoped for his demise. Answering his enemies' prayers, Count Cagliostro failed to work his magic upon the Freemasons of St. Petersburg or their rationalist queen, Catherine the Great. McCalman remarks that Cagliostro placed his life in great danger by introducing free healing clinics

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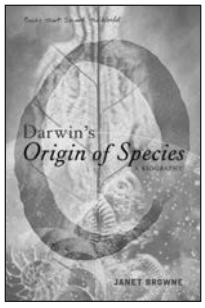
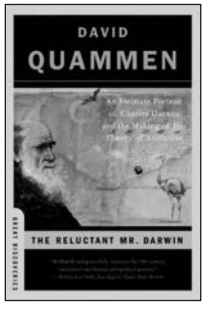
to aid St. Petersburg's poor. Facing the very real threat of execution by Catherine the Great, the Count and Seraphina fled to Warsaw, Poland. Besieged by Poland's Masons to transmute base metals into gold, he was soon exposed as a fraud there—and then it was off again to safer lands like Germany and France for the Count's troupe.

Reaching Paris, the Count resumed his healing practices and engaged in further alchemical experiments. He became embroiled in the Diamond Necklace Affair, an intrigue that transpired at the court of King Louis XVI of France before the French Revolution. It involved one Countess de La Motte, who attempted to procure, allegedly for Marie Antoinette, but truthfully for herself and allied confederates, a diamond necklace worth over one million livres—at the time, basically the cost of a new warship. This affair earned the scorn of Marie Antoinette, the enmity of King Louis XVI, and earned the Count a stay in the Bastille. Miraculously exonerated in the courtroom, Count Cagliostro fled to London in 1786, where he became a target of an English satirist employed by the Bourbons, and public opinion soon turned against him. Leaving England, "The Copt," as followers now called him, journeyed to Rome, where he was betrayed to the Inquisition by his wife of many years. He was tried and sentenced as a heretic in 1791. Godfather to today's mediums, faith healers, and fortunetellers, he died four years later within the fortress walls of San Leo.

McCalman builds a strong case via exemplary historical research that perhaps there was no greater occultist in Western history than "The Copt." What other occultists in the years following the Count's death can be credited with such popularity? Certainly none of the twentieth century's occultists like the drug-abusing, orgy-loving Aleister Crowley or circus entertainer turned Satanic high priest, Anton LaVey. Iain McCalman deserves praise for composing a balanced account of an intriguing and complex personality.





Endless Forms, Endless Controversy

GREG MARTINEZ

Darwin's Origin of Species: A Biography. By Janet Browne. Atlantic Monthly Press, New York, 2006. ISBN 978-0-87113-953-5. 174 pp. Hardcover, $20.95.

The Reluctant Mr. Darwin: An Intimate Portrait of Charles Darwin and the Making of His Theory of Evolution. By David Quammen. Atlas Books, W. W. Norton, New York, 2006. ISBN 978-0-393-05981-6. 304 pp. Hardcover, $22.95.

It is a shopworn joke that there is more than an ocean separating America and England, but there may not be a stronger illustration of this than in the figure of Charles Darwin. He is a revered figure in England—in 2000 he replaced another Great Briton (Charles Dickens) on the ten-pound note (reportedly because his more ornate beard would be harder to counterfeit)—but is a widely reviled figure in the United States in some quarters, being the scapegoat of social inequality and unrestricted capitalism by the political left and blamed for rampant immorality and corruption by the political right.

Two recent short biographies, *Darwin's Origin of Species: A Biography* by Janet Browne and David Quammen's *The Reluctant Mr. Darwin: An Intimate Portrait of Charles Darwin and the Making of His Theory of Evolution*, share the same source of inspiration and illuminate the life of one of the greatest of all human minds by focusing on his struggle to formulate and publish his epochal work *On the Origin of Species*. While neither will rehabilitate him in the eyes of his detractors, both are literate, absorbing, and rewarding portraits, whether read separately or together.

Browne's book is the shorter of the two and, at less than a tenth of the length of her magisterial two-volume biography of Darwin, serves as a handy distillation of that text. Scholarly and sober, it is nonetheless an absorbing retelling of an involving, if familiar, tale. Darwin's life follows the familiar, classic trajectory of a lost youth who finds purpose relatively late in life in the face of much disapproval from an overbearing widowed father—and a famous one at that—who was also the son of a famous man (Erasmus Darwin). It is a treasured irony that the youth that Robert Darwin disdained as nothing more than a "rat catcher" would eventually emerge as one of the towering intellectual figures of world history.

Given the pressures on Darwin to live up to his lineage, it is no wonder that he sought the opportunity to wander by joining the crew of the surveying ship the *Beagle*, a journey that lasted five years. This voyage not only brought us a marvelous book and Darwin's first recognition as a naturalist, but it also brought forth a singularly great idea which only came to light after great

delay. It is this delay that is the centerpiece of both books.

There is a fourteen-year gap between the publication of *The Voyage of the H.M.S. Beagle* and *On the Origin of Species*, and much has been made of this delay. Both books discuss this in depth, though Quammen's does so with greater drama and psychological insight, finding that the motivations behind it are many and complex. During this time, Darwin married and tried to raise a family but suffered the deaths of some of his children, including his favorite daughter Annie. He did have pigeons, barnacles, and other specimens to study, but he had unexplained spells of nausea and vomiting to endure. All the while, he jotted in notebooks and pondered where his observations and voluminous data would lead. Darwin fretted about the implications of his idea—that this would be an even bigger blow to anthropocentrism than Galileo's—but it certainly did not prevent him from publishing it.

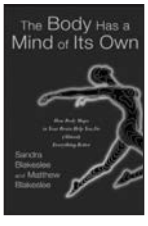
What quelled his procrastination, fittingly enough, was competition. In June 1858, Darwin received a letter and a paper from a younger biologist named Alfred Russel Wallace proposing that evolution was driven by natural selection. This coincidence finally spurred Darwin on, and within a year his masterpiece was written and published. With more than two-thirds of his life passed, Darwin finally made his mark.

Quammen's book gives a rich and colorful account of the impact of *Species*. Darwin's England was a more enlightened, prosperous place than Galileo's Italy, so while there was no governmental or royal power brought down upon him, there were many heated discussions of the implications of his work. The monumental arguments between Bishop Wilberforce and T. H. Huxley were repeated worldwide and echo down the ages, less so now in Europe but still strongly in the United States.

In the last two decades of his life, Darwin no longer procrastinated. With his great and controversial idea out and in continual discussion, he added to its refinement through books and papers, eventually publishing an autobiography. It took him fifty years to reach this pinnacle, and after the difficult birth of natural selection, Darwin settled in to what he really was: a gentleman naturalist on a quiet country estate, growing a memorable beard that matched his quietly monumental contribution to scientific materialism. It was here that he was able to closely observe the world he had changed so irrevocably. □

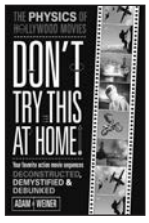
NEW BOOKS

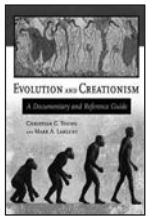
Listing does not preclude future review.



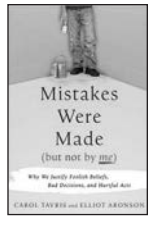
THE BODY HAS A MIND OF ITS OWN: How Body Maps in Your Brain Help You Do (Almost) Everything Better. Sandra Blakeslee and Matthew Blakeslee. Random House, New York, 2007. 228 pp. Hardcover, $24.95. A noted third-generation science writer, Sandra Blakeslee (a *New York Times* correspondent), and her son, Matthew, here report on new discoveries of how your brain maps your body, the space around your body, and the social world. The invisible volume of space around your body out to arm's length is part of you, they say. "This is not a metaphor, but a recently discovered physiological fact. Through a special mapping procedure, your brain annexes this space to your limbs and body, clothing you in it like an extended, ghostly skin. The maps that encode your physical body are connected directly, immediately, personally to a map of every point in that space and also map out your potential to perform actions in that space. Your self does not end where your flesh ends, but suffuses and blends with the world, including other beings." The work represents another piece of the puzzle about how our sense of self is created. They explore the science and the implications for all of us.

DON'T TRY THIS AT HOME! The Physics of Action Movies. Adam Weiner. Kaplan Publishing, New York, 2007. 264 pp. Softcover, $17.95. How many times have you, when watching an action scene in a movie or on television, wondered, Could that really happen? David Weiner, a physics teacher in a college prep school in La Jolla, California, here deconstructs, demystifies, and debunks our favorite action movie sequences. He calls on physics and physical principles in all his analyses, and, unlike some similar books on the science of action heroes and the like, he analyzes scenes quantitatively. The level of physics is fundamental; the math level is algebraic. The book is intended not just for students taking a first-year physics course but also for anyone interested in movies and physics.



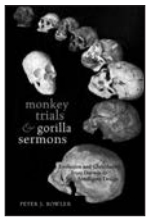


EVOLUTION AND CREATIONISM: A Documentary and Reference Guide. Christian C. Young and Mark A. Largent. Greenwood Publishing, Westport, Connecticut, 2007. 298 pp. Hardcover, $85. Unlike most books on the title topic, this one consists mainly of classic, original articles and papers (and several key court decisions) by scientists and others throughout the entire history of the debate. Sections include Evolution before Darwin's the *Origin of Species* (Erasmus Darwin, Lamarck, Cuvier, Paley), Darwin's Theory of Natural Selection (Darwin, Wallace, and Huxley), Reviews of Darwin's Work (Gray, Agassiz, Lyell, Wilberforce), Evolution and Anti-Evolution in the Interphase (Bateson, Osborn, others), The Rise of Fundamentalism and Its Opposition to Evolution (Kellogg, the Scopes decision, Williams Jennings Bryan, Clarence Darrow), The Modern Evolutionary Synthesis (Huxley, Dobzhansky, *Epperson v. Arkansas*), From Equal Time to the De-Emphasis of Evolution in American Schools (Simpson, Morrison, Overton, Lauden, Ruse, Pope John Paul II), and Intelligent Design and the School Board Debates (Behe, Ruse, Johnson, John E. Jones III's *Kitzmiller v. Dover*).

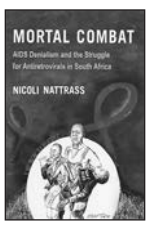


MISTAKES WERE MADE (BUT NOT BY *ME*): Why We Justify Foolish Beliefs, Bad Decisions, and Hurtful Acts. Carol Tavris and Elliot Aronson. Harcourt, New York, 2007. 304 pp. Hardcover, $25. Social psychologists Carol Tavris (a CSI Fellow) and Elliott Aronson examine in this very readable book how the brain is wired for self-justification (see their Comment and Opinion column on the same topic in this issue). As they say, most people, when directly confronted by evidence that they are wrong, do not change their point of view but justify it even more tenaciously. We see it in politics all the time, but it appears to be a universal trait. We all do it to some degree. They begin with a chapter on cognitive dissonance, "the engine that drives self-justification," and continue providing

valuable explanations of self-deception—how it works, the harm it can cause, and how you can overcome it.

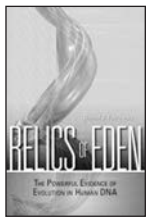


MONKEY TRIALS & GORILLA SERMONS: Evolution and Christianity from Darwin to Intelligent Design. Peter J. Bowler. Harvard University Press, Cambridge, Massachusetts, 2007. 256 pp. Hardcover, $24.95. A scholar's survey of the history of the engagement of religious faith with scientific evolutionism. Bowler, professor of the history of science at Queen's University, Belfast, shows how whole ranges of alternative positions have been explored. They establish a continuous spectrum of opinion where, he says, creationism and extreme Darwinists want us to see only black and white alternatives. He calls for a critical historical approach to help understand—if not resolve—the tensions that still divide the modern world on this issue. Bowler says he hopes that by writing from a perspective shaped by residence outside North America, he can shed some light on the less confrontational aspects of the interaction.

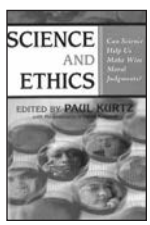


MORTAL COMBAT: AIDS Denialism and the Struggle for Antiretrovirals in South Africa. Nicoli Nattrass. University of KwaZulu-Natal Press, Scottsville, South Africa, 2007. 257 pp. Softcover, $34.95. A clear, concise, and accurate history of the struggle between AIDS denialism and science, with particular reference to South Africa, where denialism reached high levels of government but is now in retreat. Nattrass, author of our September/October 2007 issue cover article on the same topic, is director of the AIDS and Society Research Unit at the University of Cape Town. She exposes the strategy and tactics of AIDS denialists and focuses on the struggle for antiretroviral drugs to prevent mother-to-child transmission of HIV and to extend the lives of people living with AIDS.

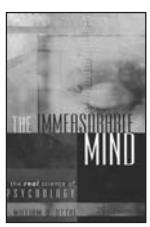
PRESENT AT THE FUTURE: From Evolution to Nanotechnology, Candid and Controversial Conversations on Science and Nature. Ira Flatow. HarperCollins, New York, 2007. 340 pp. Hardcover, $24.95. Science journalist and host of National Public Radio's *Science Friday* Ira Flatow explores in lively fashion a grand array of topics on the frontiers of science and technology, derived from three decades of interviews and interactions with top scientists and researchers. Topics include the brain, cosmology, global warming, energy, nanotechnology, the oceans, science and religion, pioneers present at the future, the ultimate computer, the quest for immortality, and the beauty in the details. The last section includes a chapter "Why an Airplane Flies: Debunking the Myth," a valuable report on the effort to revise textbook explanations based solely on the Bernoulli principle.



RELICS OF EDEN: The Powerful Evidence of Evolution in Human DNA. Daniel J. Fairbanks. Prometheus Books, Amherst, New York, 2007. 280 pp. Hardcover, $24.95. An exploration of the powerful DNA-based evidence of human evolution. The "relics" of the title are the millions of functionally useless but scientifically informative remnants of our evolutionary ancestry trapped in the DNA of every person. A university professor and research geneticist, Fairbanks shows how DNA analysis confirms paleontological evidence that humans originated in sub-Saharan Africa (the "Eden" of the title) and migrated from there through the Middle East and Asia to Europe, Australia, and the Americas. He appeals to religious Americans not to be fooled by the pseudoscience of creationists and intelligent design advocates and to abandon the false dichotomy between religion and real science.



SCIENCE AND ETHICS: Can Science Help Us Make Wise Moral Judgments? Paul Kurtz, with the assistance of David Koepsell. Prometheus Books, Amherst, New York, 2007. 359 pp. Softcover, $21. Can science help us resolve moral problems? Many think morality is the exclusive domain of religion. But this volume presents a collection of authors who generally maintain that science can help us make wise choices and that an increase in scientific knowledge can influence ethical values and bring about new ethical principles. Among the thirty contributors are distinguished scientists and philosophers including Arthur Caplan, Scott Lilienfeld, Mario Bunge, Thomas Szasz, Susan Haack, Ronald Lindsay, Barry Beyerstein, Donald Calne, Ted Goertzel, and Christopher diCarlo. Topics include biogenetic engineering, stem cell research, organ transplants, human enhancement, abortion, euthanasia, psychiatry, and psychotherapy.



THE IMMEASURABLE MIND: The *Real* Science of Psychology. William R. Uttal. Prometheus Books, Amherst, New York, 2007. 296 pp. Hardcover, $29. Is psychology a science? It lacks the basic quantitative or conceptual foundation for a consensus view on how the brain works. Is it on the verge of developing such a foundation? "Probably not," answers psychologist William Uttal in this critical examination of psychology's underlying principles, assumptions, and concepts.

THE CHICKEN LITTLE AGENDA: Debunking 'Experts' Lies. Robert G. Williscroft. Pelican Publishing, Gretna, Louisiana, 2006. 256 pp. Hardcover, $23. If you want a strong critique of environmental extremism, overheated arguments used by the so-called "Greens" and others, this may be your book. The author's targets are environmental doomsayers of all sorts, what he calls the Chicken Little factor ("the sky is falling"). In his view these include not just truly extremist arguments, but also the greenhouse effect, the dangers of nuclear war, the shortage of water, and the ozone layer. Williscroft is a retired submarine officer, engineer, and adventurer. The style is lively, personal, and ideological, not scholarly or scientific, and not in any way balanced, so be forewarned.

—Kendrick Frazier □

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What Is Common about Common Sense?

Perspectives from Anthropology

LATHEL F. DUFFIELD

The idea of "common sense" fuels the popular intelligent-design (ID) explanation for biological evolution. According to psychologist Scott Lilienfeld, it is "the public's erroneous belief that common sense is a reliable guide to evaluating the natural world" that contributes to ID's popularity (Lilienfeld 2005, p. 46). Unfortunately, Lilienfeld, like others who use the concept of common sense, often leave it to the reader to define. Perhaps we should examine this popular concept and try to determine what is actually common about common sense.

John Horgan, a science journalist, in his article "In Defense of Common Sense" (Horgan 2005) says that it is "ordinary, nonspecialized knowledge and judgment." Merriam Webster's dictionary defines the term as "sound prudent judgment or the unreflective opinions of ordinary men. . . ." In the same dictionary, the word *common* has as one of its definitions "belonging to or shared by two or more individuals or by all members of a group." Thus, common sense is a judgment or opinion shared by members of a group. This sharing makes common sense a cultural pattern that is a part of the overall cultural configuration of society. There is no evidence or suggestion that common sense is based in man's biological makeup. It is a shared pattern of thinking that when engaged would invariably reach a common conclusion. According to this definition, common sense is then a learned way of thinking.

Using "common sense," many Americans conclude that the shortest distance between two points is a straight line. Of course, those who draw this conclusion often are not aware of the assumption underlying their answer. They do not realize their answer assumes a "flat world" (Euclidean geometry), which was the state of knowledge at the time this postulate developed. Now, it is common knowledge that we do not live on a flat earth. But "common sense" has not caught up with current knowledge. The answer to this question today should be, "It depends!" Since Earth is more or less globular, the shortest distance between two points can also be a curved line (non-Euclidian). For common sense to have validity, the individual espousing such judgment should be sure that it is based on current knowledge.

In America, common sense about mankind's status in the animal world is intimately related to long-standing religious concepts and the belief in our "uniqueness." Ask most Americans how many souls a person possesses, and the likely answer is one. But in other societies (if the question would even make sense to them), the answers may well range from one to twelve! Americans' response to this question is not necessarily the only correct answer. Because this falls into the realm of belief, the answer cannot be objectively validated. But many Americans think: "I believe it, therefore it must be true."

The religious influence on man's classification in the animal world is seen even in early scientific classifications of humans (i.e., Linneaus dubbed man *Homo sapiens*, "thinking man," believing at the time that other animals lacked this ability, and this was something that made man unique). It was also assumed at the time that man was at the top of the animal kingdom. That common-sense assumption ignores the vast number of shared genetic and physical traits man has with other animals. Also, even using the word *man* with its narrow definition implies that this animal is something separate and distinct from other animals. In the Navajo language, the word for "man" is literally translated as the "animal with five fingers." Were we Zuni Indians, the word we would use would have a very broad meaning, since the Zuni make no distinction between man and the other parts of nature that the Zuni consider to be alive. The "categories *human, animal, nature,* and *man* are alien to the Zuni classification of the universe . . ." (Walker 1979, p. 150).

Common sense, as found in various societies, explains the world and man's place in it. As I've noted, the common-sense explanation of humanity's place in nature as expressed in American society and culture is not one that is universally shared. Most Americans see man as a unique being, and, while biologically part of the animal world, man is separated from the beasts by possessing a unique spirit and a complex set of emotions. It is this "common-sense" definition of man that contributes to the

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popularity of ID. In essence, God made us in his image.

Americans who are not aware of the depth and power of the assumptions guiding their thinking see the world in only one way—the American way. Until they accept the fact that the American worldview is not universal and that it is only one way of seeing and understanding the world, they will not be willing to accept that human beings are part and parcel of the animal world.

How might we make them see this? Individuals need to be made aware of the fundamental assumptions in their thinking. The world and the people in it are complex and can be viewed in many different ways. However, if the person is blinded by faith, ideas and attitudes cannot be readily altered by reality. After all, there are people today who still believe in a flat earth.

What then is common about common sense? Common sense is that shared "knowledge" with associated value systems that is acquired by individuals or groups in a society. For the general public, knowledge comes from a variety of places—parents, peers, friends, teachers, preachers, radio, television, books, magazines, etc. Common sense depends on a person's acceptance of certain unstated assumptions and premises. Sharing this knowledge/value system with friends and family helps create a common bond. "Critical thinking" (evaluation of accepted "facts") may occur in common-sense systems when the knowledge system is challenged. The responses by those who possess the common-sense system are designed generally to maintain the integrity of the group's shared knowledge/value base.

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FOLLOW-UP

The Global Warming Debate: Science and Scientists in a Democracy

STUART D. JORDAN

As the author of two recent SKEPTICAL INQUIRER articles on global warming and climate change, I would like to offer some concluding thoughts on this topic, which enjoys an emerging consensus among an overwhelming majority of researchers working in the field but remains controversial among some in the general public. Because the issue deals with future activities of important sectors of the American economy, it is not surprising that the magazine has received an unusually large number of responses to it. My two articles ("Global Climate Change Triggered by Global Warming," Parts 1 and 2, May/June and July/August 2007) speak for themselves, as do the follow-up comments of the critics and the supporters (September/October 2007). Since my response to the critics appears in that issue as well, I will not review that dialogue again. However, the exchange did raise important questions about the role of science (and of scientists) in a democracy, and it is this topic I wish to address here.

It is important that the public have a reasonable understanding of what science is and of what science can and cannot do in helping to settle issues that eventually reach the public square and thus take on a political dimension. Most people understand that science is a process for seeking the truth about how the natural order works. It is the process itself, not the results of applying it, that lies at the heart of science. Fewer people may realize that this process virtually guarantees the integrity of science in the long run even if individual scientists make mistakes, as all occasionally do, or if a (very) rare individual is actually dishonest and falsifies data. This guaranty results not from any intrinsic moral superiority of scientists themselves, but from the fact that research examined by scientific colleagues in the most prestigious medium, the refereed publications, is quickly subjected to ruthless examination for any errors. Those who detect an error often gain as much credit for their scrutiny as those whose work survives it. Scientists who deliberately avoid this scrutiny by publishing their work in

less respected media are understandably and properly given less credence for their efforts. History has demonstrated convincingly that the latter work is much more likely to contain serious errors.

Science does not offer certainty. The results of modern science are typically presented in the language of statistics and probabilities. This is especially true of scientific studies of complex phenomena, of which climate science is an excellent example, even though these phenomena remain rooted in the basic laws of nature. Nevertheless, the existence of "uncertainty" has led some individuals less familiar with science to interpret any uncertainty as evidence for "a major scientific controversy" even when there is none. Thus the general public is vulnerable to the claim that a major scientific dispute over climate science is underway between two equally large and well-qualified groups of scientists, when this is simply not so. Often this false claim is made by those who wish to discourage action to address the problems associated with climate change. There are certainly a few scientists of integrity who remain skeptical of the current near consensus, but the interested reader might consider the language of some of the critics and investigate their sources.

The real issue at stake today is what to do in light of what science has uncovered. Here there is a real controversy. One group favors action in response to the alarming evidence that global warming is definitely occurring, most likely driven by anthropogenic greenhouse gases, while the other side opposes this view for reasons ranging from a few still-unresolved scientific questions to concerns of a more economic and political nature. Typically, the latter group is dominated by those fearing change of the industrial status quo, and they tend to be more vehement in advocating their position.

This leads into two final issues needing comment. The first acknowledges the importance of addressing the economic dislocations *and economic opportunities* that will result from actions to mitigate the effects of global warming. There is an understandable—not always unwise—human tendency to want to continue with the familiar. This produces a natural inclination to oppose change unless it becomes disastrous not to do so, which can lead to overlooking the many—in this case economic—opportunities associated with pursuing more climate-friendly and eco-friendly technologies. These include many technologies already available, with others undergoing current development that could be accelerated if proper economic incentives were provided. Interested readers can find examples, which I was unable to include in my articles due to space constraints, at www.cfidc.org/opp/jordan.html.

The final question I wish to address is what the responsibilities of scientists are in a democracy that, de facto, provides much of the funding for their research. Many working scientists would prefer to have little to do with the political process, yet there is no denying that most scientists today receive much of their support from governments.

Performing one's research with integrity is obviously part of the answer, but is it the full answer? Some would say yes and defend this position by noting that distracting a competent researcher from his or her research is likely to reduce scientific productivity. As one who has both performed and managed research, I agree with this position under most circumstances. However, if major public policies depend on science for their proper formulation, as is true of climate science today, a strong case can be made that it becomes the duty of the scientist to inform the public and the political establishment of the best science available on the issue, especially when there are others exerting a major effort to suppress consideration of it. A historical example was the effort of the atomic scientists following World War II to inform the public of the unprecedented power and appalling destructiveness of nuclear weapons. A growing number of climate scientists, and others in related fields, are engaging in a similar educational effort today. I believe this effort serves the public well, and that it should continue. □

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Cinema Fiction vs. Physics Reality

The two articles on The Science Behind Science Fiction in our July/August 2007 issue—"Cinema Fiction vs. Physics Reality: Ghosts, Vampires, and Zombies" by Costas J. Efthimiou and Sohang S. Gandhi and "Superhero Science" by Benjamin Radford—got a lot of readers' juices flowing. Here is a representative sample, followed by Efthimiou's reply.—EDITOR

Thanks for another interesting issue and for continuing to broaden the scope of coverage. I particularly enjoyed the two articles on popular entertainment and science. The idea of using superheroes to introduce scientific concepts is worth encouraging.

I would like to call everyone's attention to another fine example of this approach. The book is *The Physics of the Buffyverse* by Jennifer Ouellette (Penguin 2006). The author uses examples from the popular TV show *Buffy the Vampire Slayer* to introduce a host of physical concepts and covers both classical and modern theoretical physics. She includes a bonus of covering some intriguing ideas in biology and chemistry as well.

The book is easy reading, and if you enjoyed the TV show, truly grabs your interest and focuses your attention on a number of complex scientific issues. The explanations are a good, solid, general introduction, and several have encouraged me to seek out additional (more conventionally presented) information. I haven't had so much fun with a science read since way back in the dark ages (that would be the 1950s) when an uncle gave me a copy of George Gamow's *One-Two-Three Infinity*. That book was responsible for my lifelong interest in science. This book, being far more contemporary in style and content, should do the same for today's young readers.

Robert L. Folstein
Greenfield, Wisconsin

I thoroughly enjoyed the article "Cinema Fiction vs. Physics Reality," perhaps for the wrong reasons. As a longtime fan of vampire films, I had often wondered if the growth of the vampire population would not have led to the extinction of humanity. Your article also demonstrates Coleridge's remark that fiction requires the willing suspension of disbelief.

Manuel J. Mari
Coral Gables, Florida

I enjoyed very much the article comparing the physical reality to the horror movie world, but unfortunately Messers Efthimiou and Gandhi are sadly unaware of their vampire lore. The authors claim that vampires cannot exist because as their population grows, the world's population decreases and soon we will all be vampires, but they totally forget about the role of the fearless Vampire Slayer!

Sure, so vampire #1 can claim his first victim, but there stands Buffy with her wooden stake ready to destroy the vampire, bringing the population back down to one. Even if Buffy is on vacation, Professor van Helsing is always available to use his stake as well or expose the vampire to sunlight, again reducing the vampire population.

Even if the vampire population grows to four or eight, our vampire slayers have a whole month to reduce the population back down to one (the ever immortal Dracula always seeming to elude destruction!).

So far from debunking the vampire legend, the authors have actually made a case for sainthood for Buffy! After all, we would all be dead (or undead, as the case may be) without her!

David Cramer
Anaheim, California

I was greatly entertained by the article by Costas Efthimiou and Sohang Gandhi on the reality behind movie monsters. In particular, I enjoyed the section computing the gradual attrition of humans under the onslaught of vampires. However, there is a significant confounding factor that the authors didn't address—call it the "Buffy Factor." The authors assumed that we would be sitting around passively waiting for vampires to come and drain us of blood, something I personally think unlikely, particularly given the extensive literature on how to kill the blood-sucking pests.

Rather than the geometric progression of vampire creation, perhaps the limiting factor should be the availability of trees for stakes, the intensity with which metallurgists could produce crucifixes, or the ability of farmers to ramp up the production of garlic.

Susan Johnston
Bowie, Maryland

I have to give Costas Efthimiou and Sohang Gandhi credit for having their hearts in the right place for their cover article "Cinema Fiction vs. Physics Reality." But in their haste to debunk the supernatural use of physics, I think they've overlooked some things.

Take vampires, for instance. Sure, it's true that if a vampire created another vampire every time it fed, the world would very soon be up to its neck in creatures of the night (Stephen King made use of this idea in *Salem's Lot*). But one very basic reality of biology is that any parasite that destroys its host too quickly also destroys itself. Surely vampires would be smart enough to be aware of this. Way back in *Dracula* (the granddaddy of all such stories) Bram Stoker established that being drained of blood by a vampire only turned you into a very dead corpse. The bloodsucker must deliberately decide to create a new vampire with a specific ritual. (In the recent novel *The Historian*, a vampire must bite the same person three times, for example.) So it's logical to assume that vampires would voluntarily keep their own numbers down for simple reasons of survival, rendering the authors' *reducto ad absurdum* invalid.

Besides, their analysis also totally failed to take into account one very obvious source of decline within the vampire population itself—namely vampire hunters! In the movie *Blade: Trinity*, the title character claimed to have personally killed 1,182 "familiars" (humans who voluntarily serve vampires in the hope of being "turned" some day), and anyone who watches the movies can assume that he has accounted for at least that many true vampires as well. I'd say that puts a pretty large dent in their numbers!

Thomas Barefield
Waynesboro, Georgia

Efthimiou and Gandhi miss the point about the proliferation of vampires for two reasons. First, they argue that vampires would quickly

eliminate the human species because a vampire's victim becomes a vampire. But fictional vampires need not adhere to that rule. In my vampire novels, I've added conditions making the production of vampires a much slower process.

Second, in fiction the problem really doesn't matter. Joss Whedon simply ignored it entirely in his *Buffy the Vampire Slayer* TV series, and the result was brilliant television. Viewers were also willing to ignore the problem because they were given the chance to watch one of the best television shows they'd ever seen.

Some Haitians may think zombies are the animated undead, but very few readers/viewers of vampire fiction think vampires exist outside fiction. Because of my vampire novels and an essay about vampires, my Web site gets many hits from search engines where the search string includes the word "vampire." I tabulated one month's worth of such search strings. Some were apparently by people who think vampires are real ("How can you tell if someone's a vampire?") but most were clearly interested in fictional aspects of the subject. In fact, most seemed to be looking for fiction involving vampires and sex. The results are recorded here: http://eyeblister.blogspot.com/2007/06/oh-vampires-oh-oh-oh.html.

David Dvorkin
Denver, Colorado

There is a major flaw in Efthimiou and Gandhi's argument against the existence of vampires. To bolster their argument, the authors present a Malthusian formula which predicts that, if these blood-suckers really did exist, unbridled geometric growth of their population would inevitably result in world domination and the demise of the human race—something which clearly has not happened. However, Efthimiou and Gandhi have omitted a critical constant from their formula, inclusion of which predicts a totally different outcome.

Originally known as the van Helsing Variable (vHV), this constant is now commonly called the Buffy Factor (BF), Dark Angel Force (DAF) or, Underworld Effect (UE). It's a population-control factor that automatically kicks in whenever the vampire population reaches "critical population density," or CPD, whereupon the vampires are systematically exterminated by muscled macho men and spandex-clad hotties wielding wooden stakes, holy water, and machine guns. As a result, the vampire population periodically crashes to a size of approximately n = 1, and the population has to start growing all over again. And again. And again.

By including the vHV/BF/DAF/UE constant in Efthimiou and Gandhi's formula, we see that vampires can indeed exist. And quite frankly, I hope they do. I have no problem with Buffy Summers, Max Guevara, or Selene (aka Anna Valerious) hanging out at my place, protecting me while I sleep.

Rick Emmer
Bay Village, Ohio

Your story on the science behind Hollywood's depiction of zombies and vampires was completely wrong on both subjects.

On zombies, the authors concluded that the creation of zombies would happen so quickly that it would overwhelm the human population, and thus Hollywood's depiction was unrealistic. However, this is exactly how movies like *Dawn of the Dead*, *28 Days Later* and the *Resident Evil* films portray things—the global human population is quickly overwhelmed as zombies are created. So Hollywood's depiction exactly matched the supposedly flawed "science" discussed in the article.

As for vampires, the authors apparently have not carefully watched the movies and TV shows depicting them. Their calculations assume that each time a human is killed, a vampire is created. However, in universes of the Anne Rice-based movies, the *Blade* films, the *Buffy the Vampire Slayer*/*Angel* TV shows, and so on, the creation of new vampires is a rare event. For example, in the Buffyverse, the vast majority of humans killed by vampires are simply left for dead. They are only changed into vampires through an elaborate process when both the victim and the demon wish this to occur (see the characters Spike, Angel, and Drusilla.)

Jason A. McGruder
New York, New York

I am writing to make one small correction of the otherwise fine article "Cinema Fiction vs. Physics Reality." The caption of the right-hand photo on page 33 is labeled "lesions in the ventricular system of the right frontal cone in a brain scan. . . ." Actually, there is no such part of the brain as the frontal cone, oxygen starvation causes damage in the brain substance rather than the ventricles, and the area being pointed to is calcification in the pineal gland, a normal structure. Also, the image is a CT scan, not an MRI, as indicated in the text of the article.

Joseph A. Borrello, M.D.
Diagnostic Radiologist
Kalamazoo, Michigan

Costas J. Efthimiou and Sohang S. Gandhi reply:

We thank all the readers who took the time to send their comments. Since most of the comments have considerable overlap, we thought we'd summarize our explanations in one reply.

First, we should correct an error that appeared in our article as pointed out by J. A. Borrello's letter. Also, the cognitive neuroscientist Terence Hines and the neurosurgeon Dick Zeilstra have made the same observation. We thank all of them for the correction. Although the text says an MRI was performed in Wilfred Doricent's case, a CAT scan is shown in the corresponding picture. The caption says the lesion shown is in the *right frontal cone*. Unfortunately, there is no such structure in the brain. In fact, the area being pointed to is calcification in the pineal gland. This area is commonly calcified in the brains of individuals of age fifty or above. Doricent, however, was younger. Although Doricent's brain scan did not result in direct proof that this was indeed a case of zombiefication based on TTX, the medical team concluded that the case was at least consistent with oxygen deprivation as stated in the second reference of the article.

Our article was not about definite proofs. We challenge the reader to devise an absolute, mathematical/logical proof that a given supernatural occurrence does not exist. Our prediction is that the reader will fail. In particular, there is no universally agreed upon mathematical/logical definition of the various apparitions considered in our article or of the manner in which they operate/behave (e.g., whether vampires deliberately control which of their victims turns into a vampire, etc., mentioned in the vast majority of the received comments). However, an inability to present a definite proof does not imply an inability to discover inconsistencies or other flaws in a claim that put it to the test.

Our article was intended merely as an entertaining vehicle of education aimed at stirring critical thinking. Our goal was to remind readers that (a) Pseudoscientific and paranormal ideas barely make sense when elementary logic and science is applied; (b) When—and *if*—there is an element of truth, it is highly distorted and hidden behind elaborate myths; (c) It is important to make probabilistic assessments of various claims using reason.

Along these lines, we observe that Davis's link between zombiefication and TTX has been viewed with skepticism. (Incidentally, Davis presented his claim in the book *The Serpent and the Rainbow,* published by Simon & Schuster in 1985, reissued in 1997. The book was not cited explicitly in the article.) Unfortunately, there has been no direct proof along this direction and, therefore, Davis's claim remains an intriguing hypothesis. There are only a few scientific studies on zombies (at least to the best of our knowledge). One that should be of interest to the readers of this magazine is that of the anthropologist Rolland Littlewood and physician Chavannes Douyon (R. Littlewood and Chavannes Douyon, "Clinical Finding in Three Cases of Zombiefication," *The Lancet*, 350 [1997] p. 1094–96) who looked at three alleged zombie cases. In all cases they were able to find medical explanations.

Many messages contend that the authors have "missed" essential ideas in the "vampirization" of humans that invalidate the calculation and, thus, the final conclusion. We assure the readers that we are familiar with all the variations of the myth. After all, how could we miss them if Hollywood and novel writers bombard us with them daily? We know about Buffy, Angel, Blade, and the other vampire hunters. We have read about multiple bites, drained bodies, transfer of blood, and other protocols necessary to create new vampires. However, none of them can change the final conclusion of the impossibility of the existence of vampires—albeit the line of reasoning might have to be modified slightly (or radically if the premises are changed considerably). No matter what *assumptions* are required, one can create a corresponding mathematical model. We intentionally simplified the assumptions and avoided sophisticated mathematical models to keep the article accessible to most readers. By introducing dynamical systems, one can construct highly sophisticated models for the vampire population versus the human population. For example, in one of the simplest models, known as *the prey vs. the predator model*, the two populations fluctuate periodically. (For a simple presentation see J. Stewart, *Calculus*, 6th edition, Thomson 2007.) If this model is used, the human population never disappears, but it fluctuates between a maximum and a minimum value. One can immediately see now an argument against the existence of vampires: the human population has not fluctuated, and even more it has kept (and keeps) increasing exponentially. One can start with this model and add additional features (such as vampire slayers, vampire diseases, accidental exposure to sunlight, vampire babies, etc.), but the final outcome will not change: vampires cannot exist since the model would predict a human population curve different from the actual one.

Also, the reader should note that this discussion is based in elementary physics and mathematics. We never discussed the social implications. Imagine what it would mean if every so often an exanguinated human corpse was found (even if only one vampire existed). Wouldn't this be *the* headline in the news? Unless, of course, all governments have conspired to keep these incidents secret. . . .

Other messages to us pointed out similar omissions/holes in the arguments of ghosts and tried to affirm the existence of ghosts based on faith or incorrect physics explanations. Unfortunately, quantum mechanics and exotic matter cannot give more substance to ghosts, and faith cannot be used as a substitute for proof. For reasons of limited space and time, we bypass a rebuttal of each of the (incorrect) attempts to use physics to make the concept of ghosts consistent.

Many Hollywood movies have some ideas that are consistent with science ideas, but the majority of movies greatly offend mathematical and scientific laws. Our reference to the movies was a motivational tool, mainly. The authors would enjoy a consistent script, although research on the issue (G. Sparks, *Media Effects Research: A Basic Overview*, 2nd edition, Wadsworth Publishing 2005) indicates that Hollywood has a negative impact on scientific literacy in the public. Ignoring misrepresentation of particular situations as detailed by Mr. Roberts, and even ignoring series like *SciFi Investigates*, *Ghosthunters*, etc., which involve people untrained in the scientific method of investigation, Hollywood's current trend is to promote the supernatural over logic and scientific inquiry. In their stories, science is irrelevant, it means trouble, is reflexively close-minded, and only laypersons will find the true solution. Fortunately, a few people have tried to reverse the unchallenged way Hollywood presents its ideas. As Mr. Folstein points out, there have been some excellent books based on Hollywood products that explain science in an entertaining way. Among our favorites are the classic book by Lawrence Krauss, *The Physics of Star Trek*, and James Kakalio's *The Physics of Superheroes*. One of us (C.E.) is involved in a more extensive project nicknamed *Physics in Films,*[1] which uses Hollywood movies as a vehicle of education to increase the scientific literacy and the quantitative fluency of the public.

Note

1. C.J. Efthimiou, R.A. Llewellyn, Hollywood Blockbusters: Unlimited Fun but Limited Science Literacy, available at http://www.arxiv.org/abs/0707.1167; C.J. Efthimiou, R. Llewellyn, D. Maronde, and T. Winningham, Physics in Films: An Assessment, available at http://www.arxiv.org/abs/physics/0609154; C.J. Efthimiou and R. Llewellyn, Is Pseudoscience the Solution to Science Literacy? available at http://www.arxiv.org/abs/physics/0608061; Cinema, Fermi Problems, & General Education, available at http://www.arxiv.org/abs/physics/0608058; Cinema as a tool for science literacy, available at http://www.arxiv.org/abs/physics/0404078; Physics in Films: A New Approach to Teaching Science, available at http://www.arxiv.org/abs/physics/0404064; Physical Science: A revitalization of the traditional course by avatars of Hollywood in the physics classroom, available at http://www.arxiv.org/abs/physics/0303005.

Global Warming: Protest the Subscription Cancelers

I'm writing to protest against the two gentlemen you mentioned in the second part of your two-part July/August editor's note, who canceled their subscriptions in protest of the SKEPTICAL INQUIRER's publishing of the first part of Stuart Jordan's two-part article: "Global Climate Change Triggered by Global Warming."

I'm so offended by their subscription cancellations, in fact, that I'm considering protesting their protest by signing up for a second and third subscription just to stymie their efforts!

Did I miss something? Whether or not they pan out to be the ultimate truth on the matter, the arguments for global warming seem reasonable and well thought out to me. At the very least, a person who calls himself rational (but does not believe that there is a connection between global climate change and global warming) should not be so positive in his position that the mere mention of the possibility of such a connection would induce a tantrum resulting in the cancellation of a subscription, for the love of Pete!

Where does their absoluteness stem from? Are these men in possession of irrefutable evidence?

A rational person, vexed as these men were, can still receive plenty of enjoyment and mental stimulation from the SKEPTICAL INQUIRER's other, more palatable, articles and features. But no! In their minds this break of ideologies has tainted the SKEPTICAL INQUIRER beyond redemption. Ha ha! It's ironic that this type of intolerant purism is identical to the emotions that cause religious schisms.

I wouldn't mourn their loss too much. Minds that have become ridged from positivity are one step away from irrationality. A rational mind, even one that disagrees with you, would have waited to read the entire editor's column, and in doing so, come across these reassuring and reaffirming words: "If in the future, new and better evidence shows that global warming is a myth and chimera, in marked contrast to the situation now, we'll be right there, reporting on that."

Michael Hinckle
Oak Creek, Wisconsin

The Moon-Landing Hoax

The article in the July/August 2007 issue regarding the Moon landing hoax ("The Earth and Stars in the Lunar Sky") prompts me to write. I am surprised that nobody appears to have offered the single biggest argument in support of the Moon landing reality. The Apollo 11 crew left on the Moon an object that could not have been placed there any other way, that could not be natural, and can be demonstrated to be on the surface of the Moon even from 240,000 miles away.

I refer to the corner reflector array. This piece of technology was left on the Moon specifically so scientists on Earth could measure much more accurately the Earth-Moon distance. By shining a laser to the general vicinity of the reflector (there will be some spreading), the light is reflected back in the same direction it was sent and can be picked up by detectors very near the source of the original laser beam. No natural phenomenon would perform such reflection. It could not have been simply dropped from an orbiting satellite, because it would likely not have landed in the proper orientation.

The reflector has been there for three-plus decades, and it is possible that enough dust has accumulated to prevent its continued operation, but, for at least the first few years, it did its passive job quite well. Scientists were able to measure the distance to the moon to within a small fraction of a meter, I seem to recall reading. Enough so, they could identify at just what (slow) rate the Moon is drifting away from the Earth.

Dan Karlan
dankarlan@earthlink.net

Supernatural and Science

Victor Stenger ("Onward Science Soldiers," July/August 2007) correctly shows that the National Academy of Sciences is wrong in its assertion that the supernatural is not a proper area of scientific investigation. It is time that those who use the word *supernatural* tell us what they think it means. Webster's says it means "not explainable by the known forces or laws of nature." If the Academy posits the existence of phenomena that are not fictional, yet don't fit with the known laws of science, then those laws are necessarily incorrect and in need of modification. If that doesn't describe legitimate science, I don't know what does. Since the laws of science are attempts to explain what is, they cannot by definition have exceptions. Any real phenomenon outside these laws means that the laws are incorrect. Thus "supernatural" is always a scientific challenge.

Jerome Shedd
Ripton, Vermont

Secrets and Lies

I was happy to finally read some critical thought regarding Rhonda Byrne's *The Secret* ("Secrets and Lies," May/June 2007). Your report examines the connections, or lack thereof, to the scientific theories that are supposedly the foundation of the secret, and finds them wishful thinking at best. That fallacy seems obvious. Yet, you did not bother examining in more detail the real science behind the secret, which is the ever manipulative science of advertising and public relations.

I would argue that all of these New Thought gurus and multi-level marketing magic health products (gou ji juice, mannatech etc.) have a very exact process behind them that deserves more elucidation. Essentially there are three primary (and requisite) components to these fads. First, there needs to be a cult-of-personality pioneer who has chosen to bring their genius and generosity to the masses, usually a brilliant doctor or scientist that realized he/she had to share his/her discovery with the world to make it a better place. Second, this person and his/her company always lays claim to some sort of scientific knowledge that has somehow been overlooked or missed by the rest of the scientific community (e.g., the importance of monosaccharide); this is always accompanied by lots of glossy pamphlets with graphs and pictures of technicians in laboratories.

Last, there is always a "just cause" or missionary-type vision that is motivating this enterprise, such as inventing a superfood so we can feed the hungry children of the world. This "mission" is accomplished by donating one percent of all sales to a charitable organization that they have aligned themselves to or created themselves. The other sociological phenomenon that helps fuel this marketing process is a "born again" new convert to religious zeal. Given the number of people in the U.S. who identify themselves as born-again Christians, blind faith to a new-found messiah can provide a devout demographic.

Darren Tellier
Edmonton, Alberta
Canada

Debating Creationists (or Not)

I have to strongly disagree with Mr. Rulon's opinions about not debating creationists ("Debating Creationists," May/June 2007). On the contrary, I feel it is very important for scientists and educators to confront the pseudoscience head on and not only debate the creationists but invite the debate actively. My own personal "evolution" from fundamentalist Christian to reluctant atheist is because of the availability of facts. The strongest way to kill superstition is to confront it with the facts, and creationism can only be destroyed by confronting it directly with the evolutionary facts. Where are the "missing links?" Show them the extensive list of transitional forms. Why are there gaps in the fossil record? Explain the vastness of the geologic time scale and the rarity of events that would cause fossilization. What about abiogenesis? Explain how this has nothing to do with evolution of the species and is a separate debate of its own. I think you get my point. We must *actively* dispel ignorance with knowledge, not ignore the ignorance!

Richard Smedley
Broken Arrow Paleo Society
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God, Arguments, and Reason

First, thanks to Massimo Pigliucci for his exposition of the ontological argument for the existence of God ("Is Dawkins Deluded?" July/August 2007). Ever since I was an undergraduate philosophy student in the 1960s, I have felt somehow mentally deficient

because I could not comprehend it. It was good to finally learn from a highly respected source that the argument is incomprehensible simply because it is nonsensical.

Regarding *The God Delusion,* I wasn't, as a philosopher, offended by what Pigliucci detected as Dawkins's "intellectual smugness" as a scientist. As Pigliucci acknowledges, Dawkins ably disproves the existence of God by making one cogent, elegant, and often justifiably sarcastic argument after another. Perhaps Dawkins maligned philosophers because so many of them have arrived at the wrong conclusion about the existence of a supreme being.

But it doesn't matter. Arrogant scientists set up a straw man for theists, who say that scientists falsely claim that science can explain everything. Of course, scientists don't make that claim. But the false perception that they do demeans both evolutionary biology and, as it turns out, contemporary philosophy—the overlapping domains of both Dawkins and Pigliucci—as much as does the scientifically illiterate statement "Evolution is only a theory."

It would be better if we, as scientists, philosophers, freethinkers, and rationalists, abandoned these labels for ourselves, and just used the term *reason* to explain our arrival at the inescapable conclusion that there is no god. Listening to theists "reason" that understanding God is "beyond reason" is a constant source of amusement—especially when they deploy the ontological argument.

Richard E. Wackrow
Polebridge, Montana □

The letters column is a forum for views on matters raised in previous issues. **Letters should be no longer than 225 words.** Due to the volume of letters we receive, not all can be published. Preferred: send letters as e-mail text (not as attachments) to letters@csicop.org. In the subject line, provide an informative identification, e.g.: "Letter re: Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122, or fax it to 505-828-2080.

MASARU EMOTO'S WONDERFUL WORLD OF WATER

Continued from page 51

process, the crystals form, change, and melt over a two-minute period.

He explains that water is life, water is prayer, water is a mirror, and water is beauty. We are mostly water, so we must allow ourselves to flow. He believes in homeopathy, flower essences, and "effective microorganism" (EM) which (among other things) can be "used to treat the dioxin resulting from the burning of refuse." Best of all, he believes water is the key to world peace. If we all pray for the water in the Sea of Galilee, it will flow into the Jordan River whose water is used by both the Israelis and the Palestinians, and they will instantly stop bombing and start hugging each other.

Guess what? He has a Web site, and it sells things. Here are some of the items you can buy:

• EM Antioxidant mouthwash and gargle to *hydrate the oral cavity*, $12 for 16 oz.

• EM Antioxidant tooth powder, $12 for 2 oz.

• Stickers with pictures of water crystals to change the atmosphere of whatever you place them on in a positive way, such as "The God of Wealth" for your wallet, and "Love and Thanks" for your cell phone. (I think I'd prefer to tell it "Silence is Golden.") A sheet of twenty-eight stickers sells for *only* $10!

• Indigo water—8 oz. of "highly charged hexagonally structured water" sells for only $35. Drinking this is supposed to provide superior hydration, enhanced nutrient absorption, more effective detoxification, increased metabolic efficiency, and improved cellular communication.

• Forty-eight Oracle Cards for $16.95. (I guess if you believe in the rest of this nonsense, you might as well believe in oracles!)

You can even learn to *teach* this stuff. You can sign up for a four-day hado instructor school for only $3,000. The Web site also has a "water crystal of the month" picture which you can download, but only for your personal use.

I suppose it's reassuring to think we could control the world with our thoughts and get the God of Wealth to bless our wallets, but another consequence of these ideas is that water everywhere is watching us and knows what we are thinking. Like Santa, it knows when we've been bad or good. The very coffee in the cup on my desk knows if I have daydreamed about George Clooney sucking my toes or had the fleeting wish that my boss would catch leprosy and be pecked to death by a rabid ostrich.

The Reverend who urged me to look into Emoto's "research" was not alone. I've met a number of people who were very impressed by *What the Bleep Do We Know!?* and even one woman who wanted to repeat the rice experiment and watch the rice rot faster when she insulted it. When I tried to give her advice on how to properly do the experiment with controls, she lost interest. It might have been fun to do a half-assed demonstration to confirm her belief, but it wouldn't have been nearly as much fun to do it right and look for the truth. A university professor told me his students largely thought the *Bleep* movie represented the cutting edge of science. I'm beginning to wonder if there really is something in our water . . . but on second thought, I'm more inclined to believe our science teachers have failed the American public.

Rationalized irrationality is alive and well. This watery fantasy is all very entertaining and imaginative, full of New Age feel-good platitudes, holistic oneness, consciousness-raising, and warm fuzzies; but it's hard to see how anyone could mistake it for science. Of course, our thoughts and words do have an effect on the world around us, but not exactly in the way Emoto imagines. Fortunately, librarians are smarter than the reverend letter writer. The Dewey decimal system lists Emoto's books under Religion-Special Topics. □

COMMITTEE FOR SKEPTICAL INQUIRY

AT THE CENTER FOR INQUIRY/TRANSNATIONAL (ADJACENT TO THE UNIVERSITY AT BUFFALO)

AN INTERNATIONAL ORGANIZATION

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